

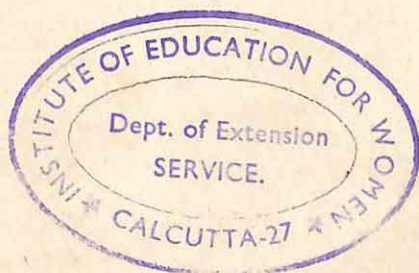
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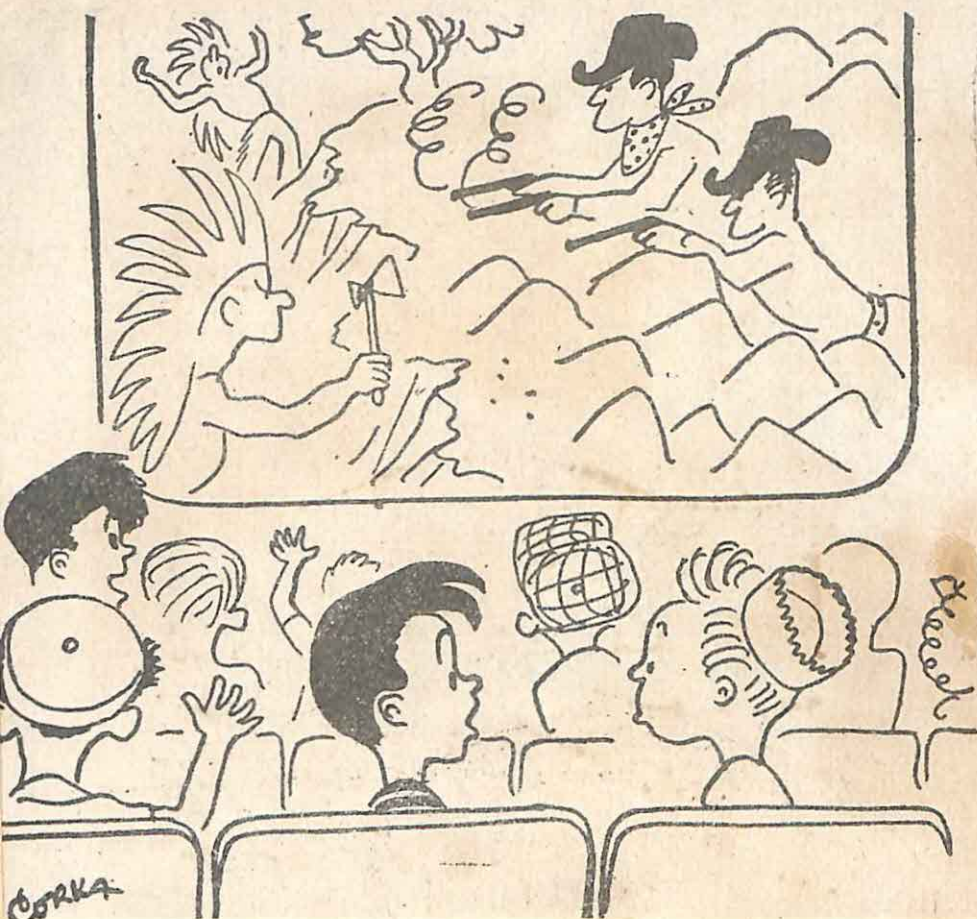
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LARGE WAS OUR BOUNTY

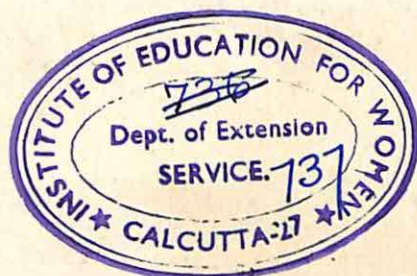
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Corka, 1944, Field Publications

"Critical Situation, Isn't It? Notice How Erosion Has Eaten Away the Topsoil"



Large Was Our Bounty:

Natural Resources and the Schools



1948 YEARBOOK, ASSOCIATION
FOR SUPERVISION AND CURRIC-
ULUM DEVELOPMENT OF THE NA-
TIONAL EDUCATION ASSOCIATION

1201 Sixteenth Street, Northwest
Washington, D. C.



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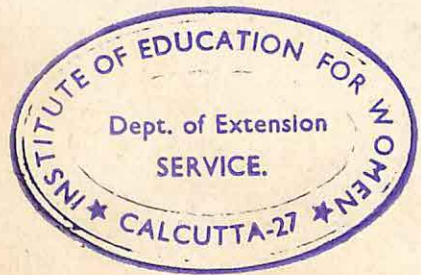
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About This Book

THIS yearbook is made up of a glance at the past, a look at the present, and a glimpse into the future. Its concern is with the development and use of our natural resources, and what schools are doing to make our use wiser.

Hardly a newspaper issue appears without reference to national misuse of our natural resources. We read of soil depletion, of burning gas at oil wells, of forest destruction, and of whole species of wildlife disappearing almost overnight. We read of plans for stock-piling strategic minerals which become scarcer each day within our borders. Our bountiful heritage of thousands of years begins to show results of abuse. If we acted on what we know, there might be little need to be disturbed because we have so rapidly spent so much of our natural bounty. Wiser actions even now could preserve a sufficiency for our need. But there are many who do not know; there are others whose actions betray their own best interests and the best interests of the society of which they are a part. That is why the school is obligated to make the facts of resources known; to make the possible choices and consequences clear; and to guide individuals to establish sets of values which will balance immediate gain against future need and private riches against social good.

Society rests on its resources—its fields and rivers, its lands and its sunshine, its minerals and its trees. And society thru ill-chosen or ill-directed efforts can destroy itself thru destroying its base. Sixth-grade children can see that. Down in Georgia at the Sand Hill School in Carroll County, a teacher had spent several weeks with her class, studying the soils and forests and rivers of her section of the state. As the study spread out she showed the film, *The River*. Children were

tense as the tragedy of destruction passed before them. They saw the forests blackened and broken, the river in flood, the people fleeing. After the lights came up, some children talked about the weird music, some about the way people had been driven to the house tops while their barns and cattle floated off. One boy shook off the magic of the sounds and scenes, however, and with flashing intelligence cut to the core. "What interested me," he said, "was that the people done it to themselves." Perhaps his grammar was incorrect. His thinking was all too right.

It was with the hope that schools can point to better understanding and wiser use of our resources that this yearbook was written. Enough schools are doing something to encourage that hope. A background was needed, however, to highlight the history of efforts in the United States, and to present a body of thought, which has been formed by the many efforts of scientists, to identify the ways in which we can develop, use, and continue our resources. Against this background, school practices drawn from all parts of the United States provide illustration and encouragement. Schools which concern themselves with community needs are bound more and more to illumine the relationships between life and its physical environment as well as the relationships among people themselves. Such schools therefore begin to study and explore the natural resources from which communities draw their sustenance.

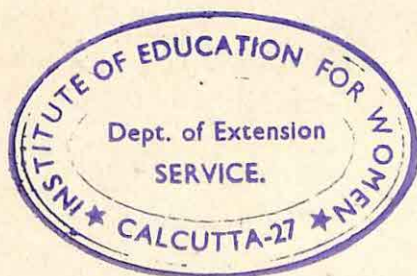
Finally, this volume looks toward the future, and suggests some guides for action. Obviously, an understanding of the environment and its relationships has to precede effective teaching about it. The future may bring changes in both preservice- and inservice-teacher education. It may bring increasing study of communities their organization and their sources of support, and more attention to the need for the kind of community intelligence, which knowing what it

wants, plans with care how to use all the materials at hand to reach its ends. Perhaps, also, the future may bring the desired program of education which will guide the natural and social sciences into a single stream of human knowledge channeled by social good.

It's a long way back to the time when this book was first conceived. The Committee extends its warm thanks to many collaborators and contributors along the road. Those who wrote and sent examples of school practices and supplied pictures are listed under "Acknowledgments." Without them, the chapter of examples could not have been presented, and the volume could not have been brightened by illustrations. To Gertrude Hankamp the Committee is particularly grateful for willing assistance with many details and with the substance of the volume itself. The chairman has a special word of thanks for Mrs. Jackie Thompson, his secretary, whose good-humored aid made the whole task easier.

The chairman wrote a rough draft of Chapters 1, 2, 3, 4, and 5, after the Committee had approved an outline. Dr. Olsen prepared the original draft of Chapter 6, using some materials already drafted by the chairman. Both as a group and individually, the Committee carefully reviewed and revised these drafts, so that the present product has been shaped by many hands. Its virtues have been strengthened and its faults minimized by that fact. You, as readers, will judge which way the balance lies.

—The 1948 Yearbook Committee



... this philosophy [of education] commits itself, first of all, to the building of a new culture. It is infused with a profound conviction that we are in the midst of a revolutionary period out of which should emerge nothing less than control of the industrial system, of public services, and of cultural and natural resources by and for the common people who, throughout the ages, have struggled for a life of security, decency, and peace for them and their children.

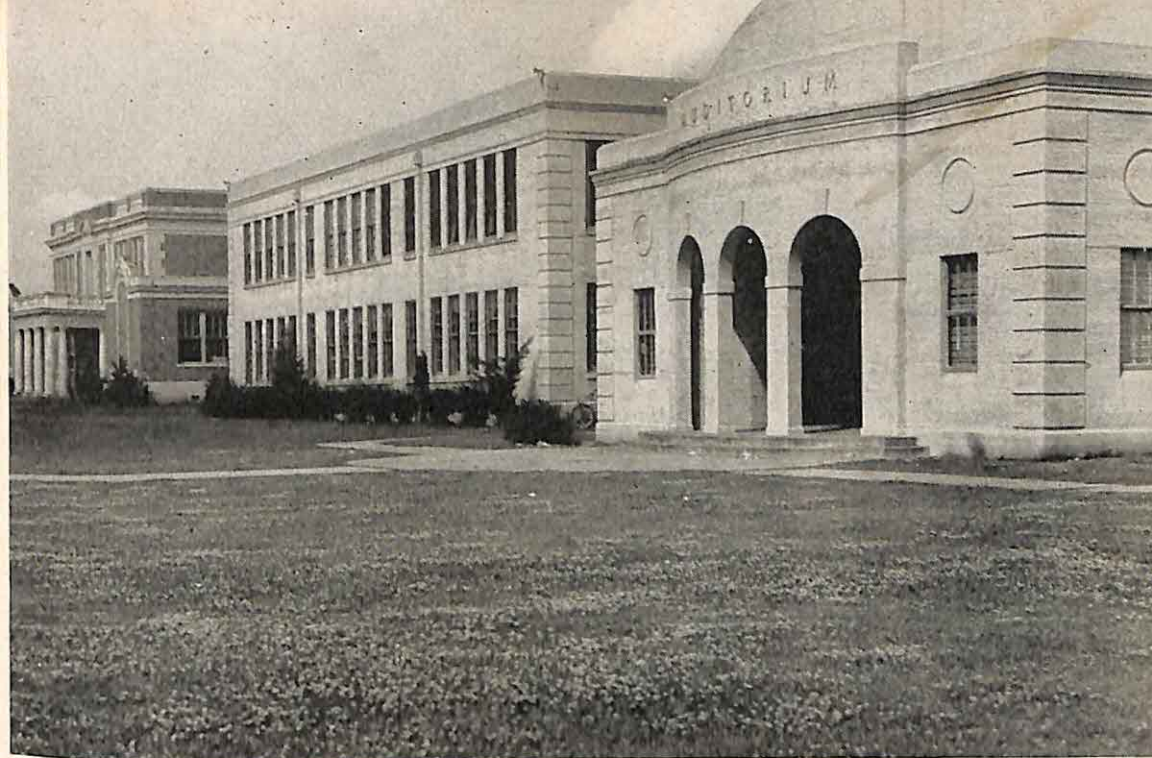
—THEODORE BRAMELD

In What Direction Are We Moving?

DOWN in Louisiana, Ascension Parish lies some sixty miles from New Orleans, a rural area untouched by industry, largely depending on the rain, the soil, the sunshine, for its support. Its living has changed but slowly over its history. It has the soft talk of the Deep South, the presence of white and Negro groups, the constant struggle to make a living out of the soil and its products.

"You Can See the Difference"

But visitors have been coming to Ascension Parish in increasing numbers to see how the parish schools have made themselves an essential part of social change. They have come to see and admire a series of planning efforts undertaken each year, thru which the school staff and other public agencies of the parish have guided the schools to a new emphasis on community betterment. "You can see the difference when you cross the parish line," a visitor said. He came to study the ways Ascension Parish has found to relate its school work to the problems of the community. He went out to see the schools and the instructional program, to find out how, in a few brief years, the program has been transformed from a traditional one into something vital both to the community and to the students of the schools. He saw schools with canning centers, feed mills, grist mills, and shops for repair of tractors, trucks, and cars. He found classrooms enlivened with exhibits and displays, and many other supplementary



Ascension Parish, Louisiana Schools

White Clover Brightens the Well-Kept Grounds of a Louisiana School

materials of instruction, such as maps, charts, books, and pamphlets. He found the school buildings often being used as community recreation centers. He saw school gardens supplying many of the school lunchrooms.

In a twelve-grade school of four hundred students, for example, he discovered that many new teaching aids are used in the social studies, which are directed toward problems rather than topics and are correlated with study in other fields, such as art and literature. Teachers have prepared materials and planned units in the language arts, with special reading materials for boys and girls who need them. Science and mathematics study are applied to local situations, using problems based on conditions and facts present in the parish. Materials of instruction include films and records as well as the specially prepared materials. Primary grades have their own room libraries, with a centralized library for grades four

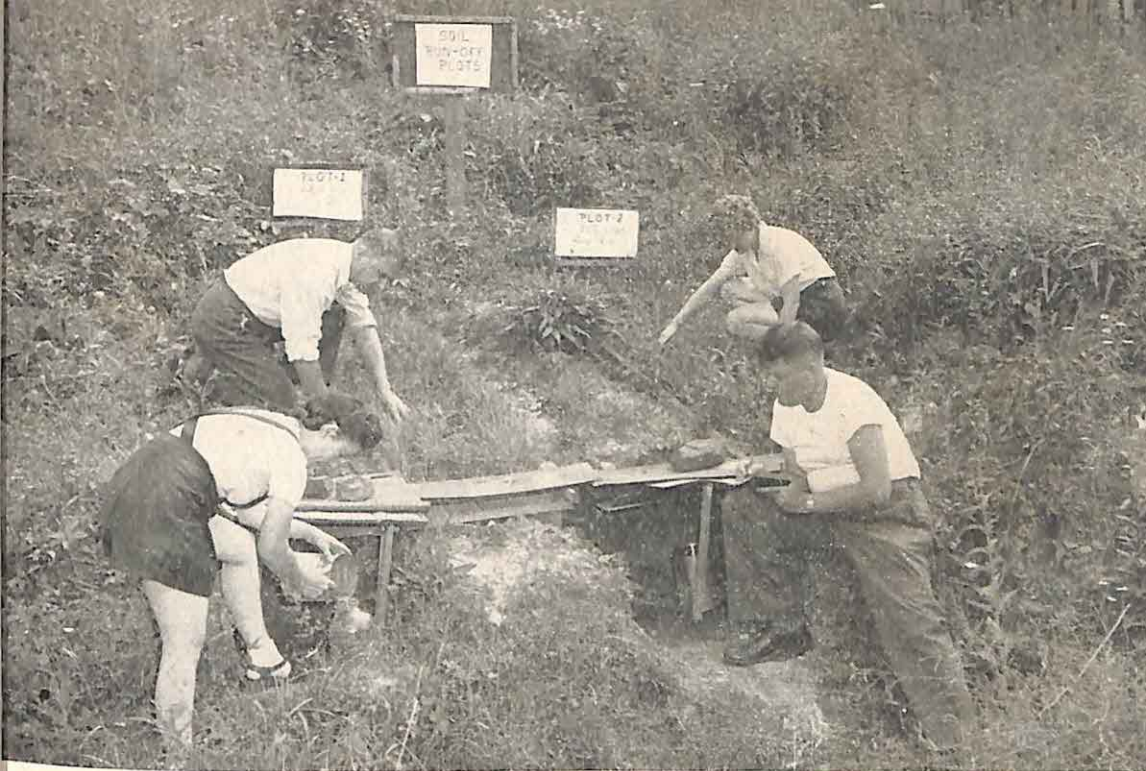
thru six, and another for grades seven thru twelve. Circulation runs more than twenty volumes per student each year. Books and magazines are continually circulated to homes in the community.

In the same school, vocational agriculture is closely related to the community life. Boys take a five-year course, carrying on activities at home under the supervision of the teacher. Six to eight thousand chicks are sold to the community each year. An Agricultural Fair and Horse Show, first sponsored by the school, has become an annual community event. Industrial training is also given for five years, with instruction in blacksmithing, auto mechanics, electrical wiring, electric motors, repair of farm machinery, cabinet-making and repair of furniture, and carpentry. Home economics includes the usual cooking and sewing, but also aspects of child development and child training.

Most important, perhaps, is the fact that each area is related insofar as possible to other areas of work. The Agricultural Fair and Horse Show provides theme topics in English. Surveys of food habits in the school provide work on graphs in arithmetic.

Significantly, all agencies of the community are brought into close relationship with the efforts of the school. The State Welfare Department works with the school on problems of sight conservation; the Agricultural Extension Service with the school on problems of soils, home living, and nutrition; the State and Parish Departments of Health, on speech correction and other phases of health. Ascension Parish has found that all its community agencies can aid in gaining better results from its resources. The effects appear both in the school and in the community.¹

¹ Adapted from, *Ascension Parish (Louisiana) Program To Improve Living Through Community Education*. Issued by the Ascension Parish Schoolboard with the cooperation of participating agencies, Donaldsonville, Louisiana. November 1946. (Mimeo.)



Ohio Conservation Laboratory

Measuring Run-off of Surface Water at the Conservation Laboratory, Leesville Lake, Ohio

A School without a Classroom

If our educational visitor, tiring of the flat land of Louisiana, left it for the rolling country around Leesville Lake east of New Philadelphia, Ohio, he could find a school without a classroom that uses two acre plots for textbooks. This school is not for young students, but rather for their teachers, who gather for six weeks of the summer to learn about man's place in nature, and to develop a point of view based upon personal knowledge and experience. They come to work with a staff of highly competent instructors who represent the four aspects of knowledge having to do most directly with resources—earth science, botany, zoology, and social science. The students find that the subjects are not kept distinct, however, but are interlocked to increase their understanding of how the total environment operates, and how man's use affects that

operation. They come to understand how soil, plants, and the varieties of life existing in the environment all fit together into a community of life. They learn to trace the effects which misuse of resources will have on social and economic conditions, and they discover ways to use the environment effectively and wisely. They find that problems of resources vary from region to region, and that each region has its own opportunities.²

The "laboratory" in which this learning takes place is the country around the lake. Each group of two students is assigned to a plot of ground—a two-acre strip of woods and clearings. The students' goal is to observe, measure, and correlate—to study all the life found in the two acres and to identify its relationships. To do this they execute many tasks looking toward a complete, detailed understanding of the geology and soils of that small segment of the earth's surface and of the plant and animal life it supports. They look at soil profiles from the top to the bottom of the slope, examining and sketching the leaf litter and humus, and the depth and texture of the topsoil, subsoil, and parent soil. They take samples of stream and run-off water before and after rain to judge the effect of water on soil retention. They chart the channels of air and water drainage, and note the mineral resources. They find out how the land is used in the present and was used in the past. They study the plants, the animals, and the insects on the two acres, searching to find the sources of that life, and the ways it builds its organized community. Miniature nature trails are set up as models for the school back home—not merely to exhibit the beauties of the environment but to illustrate the principles of its operation. A complete ecological picture is drawn, showing the relationships of life to inanimate nature, of life to life, and of natural processes

² Adapted from Conservation Laboratory Circular, *Conservation Laboratory*, State Office Building, Columbus, Ohio.

to the welfare of man. Science branches are drawn together into the larger and more comprehensive science and art of ecology, of the patterns in which life builds on other life and on non-life. The visitor watching this intensive study can be sure that the teachers will return to their classrooms with a vivid and vital sense of the relationships between man and his environment. They will be better able to present science and social science as subjects of real meaning in students' lives and to plan learning activities with children and youth.³

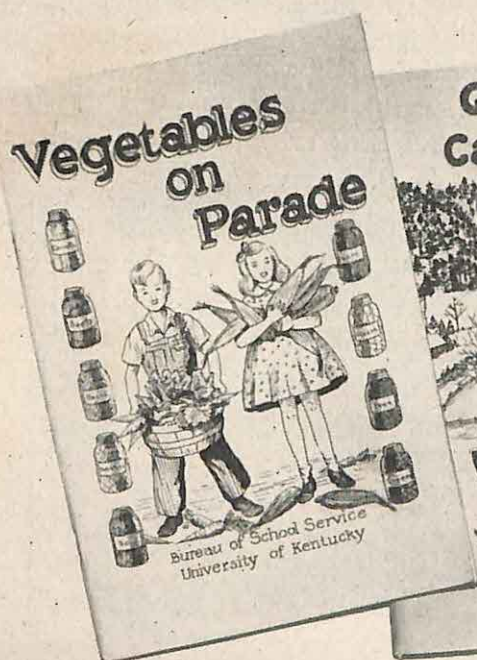
Reading for Living

Perhaps our educational visitor may double back on his path, moving now from the hills of Ohio to the mountains of Kentucky. Passing thru Lexington, he stops off at the Uni-

³ Adapted from *Soil Conservation*. United States Department of Agriculture. October 1943.

Reading Materials for Kentucky Boys and Girls

University of Kentucky



versity of Kentucky to investigate preparation of special materials of instruction which look toward better use of resources and may provide a significant evaluation of the process of education itself. At the university he looks in on a materials laboratory, where preparation of new readers for school use is going on. He picks one up and finds, somewhat to his surprise, that this seems unlike any reader he has seen before. It isn't printed from set type for one thing, and the drawings are largely line drawings, done by a person with skill but hardly a slick professional style. It is paper-backed and small. But what strikes him most is that it and others like it deal with immediately earthy subjects—how to raise goats, how to raise a garden, how to get rid of garden pests, how to raise chickens. He notices that some readers are in the vocabulary and at the reading level of the primary grades, but others are suitable for the sixth grade and beyond. And he finds them of absorbing interest, so he examines them with a realization of their possibilities in the learning program.

Our traveler then goes to two of the mountain counties of Kentucky. There soil has eroded from the hills in many places; one-room, unpainted houses reflect the drabness of the one-room schools; and the effort to make a difficult living seems to have been almost too burdensome. In the school to which he goes, however, he finds a strange thing. Children are studying those new readers, paper-bound and lithographed, with the same absorbing interest that he himself had experienced. When he talks with the teacher after the day is over, she tells him that the pupils not only show more interest in the newer material, but have a noticeably increased ability to read, and write, and figure. The material has aided the children in learning the "tool" subjects. And, the teacher says, the diets of the children are changing as they read these materials on food. Better lunches are being brought to school, more gardens are being planted in the community, and more

milk goats are being kept. Gradually it is being proved that the school can change the community, and that reading materials dealing with significant problems of the use of resources effectively modify the use of those resources and the living of the people.⁴

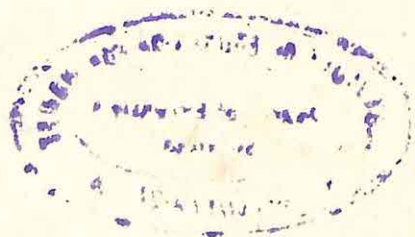
Where Do These Changes Come from?

The educational visitor, having seen three evidences of educational change, could go on to many others. But, being of thoughtful turn, he stops for the moment and begins to ask himself where these changes come from. What forces lie behind this kind of school interest which looks toward a better understanding of environment and ultimately a better use of the resources that the environment supplies?

These schools and programs are clearly pointing toward more effective education—if we can judge effectiveness by usefulness in people's lives. Ascension Parish, with its direct relationship between school and community; Leesville Lake, with its study of practical ecology; Kentucky, with its measurement of diet improvement, cannot be unrelated. They must reflect a common concern about how well man uses his environment and how education can improve the use he makes of that environment. They reflect, therefore, that growing emphasis in American life which considers the close relation between man and his environment, and recognizes the need for better understanding and care of that environment if man's use of it is to be continued and his living to be improved. To some this is known as "conservation"; to others "wise resource-use." Our growing concern with it has been

⁴ See, Maurice F. Seay and Harold F. Clarke. *The School Curriculum and Economic Improvement*. Bulletin of the Bureau of School Service, Vol. XIII, No. 1, College of Education, University of Kentucky. September 1940; and Maurice F. Seay and L. E. Meece. *The Sloan Experiment in Kentucky*. Bulletin of the Bureau of School Service, Vol. XVI, No. 4, College of Education, University of Kentucky. June 1944.

developed, however, over a reasonably long time. Our concern is not new, but its development has begun to quicken only as the problems themselves have become more pressing. We had begun to see them clearly by the turn of the century. Today they stand out in bold relief as problems with which schools must deal.



The strength of our nation is due to the continent of North America. It has molded us, nourished us, fed its abundant vitality into our veins. We are its children, lost and homeless without its strong arms about us. Shall we destroy it?

—STUART CHASE



Why Are We Concerned?

AS the present century entered its course of startling change, the people of the United States began to look for the first time at the landscape which remained after "conquering a continent." Political and economic dominance had shifted from agriculture to industry. Wealth had rolled into the fortunes made thru exploitation of great virgin resources in wildlife for furs, trees for lumber, gold for exchange, transportation for commerce. The flight from the land to the cities had well begun. America was lusty in the powers of its youth. But America was beginning to show signs of maturity.

Those signs were dramatized by the closing of the frontier, which Frederick Turner considered the major turning point in United States history. For when the frontier closed, when "free" land was no longer available to any who wished, then the "conquest" was completed and the future no longer could depend on newly won areas wrested from hostile human beings and natural forces. Progress from that point would be determined by how well we used what we had. We could no longer move on. We had conquered a continent; we needed now to learn how to keep it.

In natural endowment this was undoubtedly the richest continent of the world, with the possible exception of the land mass controlled by Russia. To such a continent, colonization brought the technics of the industrial revolution and the population overflow of western Europe. The three fac-

tors of development—resources, people, and technics—created, with a speed unknown elsewhere, a civilization of unparalleled wealth and almost boundless optimism. America became the beacon of European dreams, reflected in a tide of immigration that rapidly became a flood. The hope of the European was to attain what earlier colonists and immigrants had achieved. The basic technic rapidly became that of uncontrolled exploitation.

A Symbol and a Scandal

There were many, many illustrations to which one could point to prove that exploitation was the great American road to fame, success, and security. Chattel slavery in the South; wage slavery in the East; forest extermination in the Middle States (Paul Bunyan became a national myth, a folk hero whose simple method of lumbering was to hold a section of trees in a river until the soil at their roots washed away, leaving no soil and no trees for future use); land destruction on the Atlantic Seaboard; decimation, if not destruction, of wildlife in many sections of the country. By a stupendous irony, the South's exploitation of slaves was shifted to the East's exploitation of the South and West, as thru tariffs, discriminatory freight rates, and control of capital and patents, the East forced the other sections of the country to remain in virtual colonial status.¹

Exploitation became almost a national symbol, and a national scandal. But it can't be rightly judged from outside its era. To the European the resources of the United States did seem endless; to the New England shipowner and the Southern planter, slavery seemed economically sound and eventually morally defensible; to the farmer, trees were "weeds" which had to be cleared before crops could be planted; a

¹ See, Mezerik, *Revolt of the South and West*. New York: Duell, Sloan and Pearce, 1946. Bernard DeVoto, "The West against Itself." *Harper's* 194: 1-13; January 1947.

continent had to be conquered before it could be used; the doctrine of individual enterprise was needed to cope with frontier situations where the rifle had to precede judicial decisions; and the individual good of today had to precede thought of community good for tomorrow. To be sure, communal living was briefly and unsuccessfully attempted at such places as Brook Farm, Fruitlands, and Oneida, but these were the "lunatic fringe," whose foibles and failures amused the more "practical" folk whose eyes held steadily to the main chance.

There was some revolt with sufficient force to disturb the complacency of the dominant groups. The Populist movement was essentially agrarian, with support from a beginning labor movement. Its symbol, Bryan, dramatized its plight in his famous "cross of gold" address but populism was later so completely submerged that when various parts reappeared (such as the income tax under the Sixteenth Amendment) few recognized their source. Industrial and business dominance remained supreme. The doctrine of "free enterprise" became the rallying cry of those who wished to continue exploitation unchecked by the restraint of social benefit. A pioneer necessity had become a modern menace.

From Vegetable to Machine Civilization

The land frontier was closed, but another change was also highlighting the development of the United States. Agriculture was being superseded as the major vocation. The great fortunes distilled from virgin forests and lands were giving way to fortunes from industry and commerce. By 1929, for example, New York State accounted for 276 of the 513 persons in the United States whose incomes equalled or surpassed \$1,000,000.² This corresponded closely with the fact that

² H. W. Odum, *Southern Regions of the United States*. Chapel Hill: University of North Carolina Press, 1936. p. 452.

the Northeast at the same time accounted for 57.7 percent of all the manufacturing establishments in the United States.³

In 1930, more than 60 percent of the people lived in metropolitan areas.⁴ A total of 76.2 percent of all workers were occupied in "manufacturing, mechanical distribution, and social services."⁵ Agriculture provided less than 13 percent of the nation's income.⁶

This was more than an amazing shift in the way the United States made its living. It was more than exchanging the calm darkness of a country road for the brilliance of the boulevard, more than zest for the bustle of the metropolis. It was a shift from a dependence on one part of the environment to new dependence on another, for as the United States moved with increasing rapidity from agriculture, forestry, and wildlife to industry and commerce, it added to its major dependence on crops, trees, and animals a crucial dependence on coal and iron. In 1880, 70 percent of our needs for energy came from wood, feed, food, and water power; in 1929, 85 percent came from coal, oil, and gas.⁷ We had moved from a "vegetable" civilization to a "machine" civilization.⁸ In doing so, we enlarged our use of resources so that we used greater and greater amounts both of resources which had the possibility of being renewed and of those which could be used but not restored. Because of our superior endowment with these resources, we built surplus wealth so quickly that by 1920 we crossed the financial divide and became creditor nation to much of the world.

³ *Ibid.*, p. 451.

⁴ *Ibid.*, p. 425.

⁵ *Ibid.*, p. 426.

⁶ *Ibid.*, p. 425.

⁷ Howard P. Emerson, editor. *Applications of the Common Mooring*. Knoxville, Tenn.: TVA, 1943.

⁸ See, Erich W. Zimmerman. *World Resources and Industries*. New York: Harper and Brothers, 1933. p. 58-73.

By 1900, we had created the myth of "inexhaustible" resources. We had also increased our demands on the environment for physical resources which are renewable and for resources which cannot be renewed. We had combined a need for personal incentive and reward, "free enterprise," with the technic of the corporation, and had used it to defend the principle of the trust and the monopoly. The result had been effective beyond hope in subduing a continent. But at long last we slowly began to see that we had spent much of our capital without reckoning on tomorrow. We had stripped the accumulated wealth of centuries in a hundred years. The glorious white pine of Upper Michigan, one of the most beautiful and useful of all native woods, was gone in thirty years after the saw was first set to its trunks.⁹

The Pendulum Begins To Swing

Altho the major trend had been toward unchecked and often irresponsible exploitation of resources, other influences were already at work to offset, in some part, the destructive surges of our national life. The first of these was the establishment of colleges devoted to the teaching of "the agriculture and mechanic arts" (1862). These colleges, created from funds obtained by federal land grants to the states, became centers for teaching, research, and ultimately off-campus advice on scientific land-use and agricultural and forest practices. Ten years later efforts to place strategic forest areas under federal control began with the establishment of the Yellowstone National Park (1872), and forest reserves were established with increasing speed until by 1909 nearly 200,000,000 acres were under federal control. The Forest Service was established in the Department of Interior, the Federal Game Act was passed, and the Inland Waterways Commis-

⁹ See, John Bartlow Martin, *Call It North Country*. New York: Alfred A. Knopf, 1944.

sion established (1907).¹⁰ In 1908, however, came the first effort to create a wide public support for careful use of United States natural resources. In that year, President Theodore Roosevelt called a White House Conference on Conservation, to which he invited governors of all the states, meeting together as a group for the first time in United States history, members of Congress, scientists, and significantly, educators. The invitation to the governors stated:

"It seems to me time for the country to take account of its natural resources, and to inquire how long they are likely to last. We are prosperous now; we should not forget that it will be just as important to our descendants to be prosperous in their time."¹¹

The governors adopted a set of principles which pointed to new directions. In part they agreed:

"We declare our firm conviction that this conservation of our natural resources is a subject of transcendent importance, which should engage unremittingly the attention of the Nation, the States, and the people in earnest cooperation. . . .

"We agree that the land should be so used that erosion and soil wash shall cease; and that there should be reclamation of arid and semiarid regions by means of irrigation, and of swamp and overflowed regions by means of drainage; that the waters should be so conserved and used as to promote navigation, to enable the arid regions to be reclaimed by irrigation, and to develop power in the interests of the people; that the forests which regulate our rivers, support our industries, and promote the fertility and productiveness of the soil should be preserved and perpetuated; that the minerals found so abundantly beneath the surface should be so used as to prolong their utility; that the beauty, healthfulness, and habitability of our country should be preserved and increased; that sources of national wealth exist for the benefit of the people, and that monopoly thereof should not be tolerated."¹²

¹⁰ See, George T. Renner. *Conservation of National Resources*. New York: John Wiley and Sons, 1942. p. 42-43.

¹¹ Quoted, Van Hise and Havemeyer. *Conservation of Our Natural Resources*. New York: Macmillan Company, 1931. p. 531.

¹² Quoted, Van Hise and Havemeyer. *Op. cit.*, p. 532-33.

Brave words indeed, and for that day, strong ones. And the governors followed the conference with action. Nearly every state established conservation commissions. Theodore Roosevelt himself established a National Conservation Commission, but the Sixtieth Congress not only denied funds to the commission, but also prohibited other bureaus from assisting it. This negative action of the Sixtieth Congress foreshadowed action by the Seventy-Eighth Congress, which in similar fashion destroyed the National Resources Planning Board established by the late President, Franklin Roosevelt.

The chief accomplishment of Theodore Roosevelt was to focus national attention on the problems of natural resources, and the need for care and planning in their use. Actual results, beyond significant withdrawals of lands from the public domain, now seem fairly small, but Roosevelt had set for himself a large task in attempting to reverse major tendencies in American life. With World War I, destruction of resources grew apace, leading on to the crash of 1929, when production so greatly outran consumption that wheat piles were set on fire turning food into smoke while children went hungry. Even after Franklin Roosevelt had become President, the carry-over of classic economics so misguided our efforts to raise prices that we plowed crops under and slaughtered day-old pigs.

An Emerging National Policy

But Franklin Roosevelt, from the beginning of his administration in 1933, created a conservation program of great breadth. A roll call of administrative agencies is enough to suggest its size. The Civilian Conservation Corp, the National Resources Planning Board, the TVA, the Soil Conservation Service, the Bureau of Reclamation in projects like Bonneville and Grand Coulee Dams, and many others, executed functions which began to change the face of the continent. In

1934, the Taylor Grazing Act withdrew all that remained of the public domain for permanent grazing land. Wise use of resources was coming to be recognized as a needed national policy.

Where Are We Now?

Let there be no mistaken belief, however, that the accomplishments of the past forty-five years have firmly established the principle of public benefit as a guide to use of resources. Every advance has been made over strenuous opposition. The right of the federal government to capture the use of falling water at dams constructed on navigable streams, first stated by Theodore Roosevelt in 1903 in vetoing a bill to authorize construction of a dam at Muscle Shoals, Alabama, became the center of continuing controversy, ultimately reaching the

A Ruined Hillside in California

Soil Conservation Service, U. S. Department of Agriculture




Supreme Court in attacks on TVA.¹³ Attacks on the Taylor Grazing Act are gaining force in an effort to return to private ownership lands which now protect the grazing areas on which the cattle industry depends.¹⁴ Harold Ickes resigned as Secretary of Interior from the Truman Cabinet after a bitter controversy over whether public oil resources should be devoted to private ends.

The struggle continues, but after forty-five years it is no longer one-sided. Use of our resources is recognized as a pressing issue in our national life, and some of our well-nigh disastrous choices on how we shall use these resources are being righted. Furthermore, our knowledge of resources and how they operate has increased greatly. To some extent, at least, we have made that knowledge part of the consciousness of people generally. We now know that many resources are not inexhaustible—tho we may not always act on that knowledge. We know that ruthless exploitation runs counter to continued national well-being. We know that natural resources are tied tightly to one another and cannot be used or treated in isolation. Above all, we are beginning to realize that we are all utterly dependent on our physical environment for the continued existence of our civilization and ourselves. We can begin, at long last, to learn how to use our continent, and to have it, too.

¹³ House Document 427, Fifty-Seventh Congress, Second Session, Serial 4531.

¹⁴ Bernard DeVoto, *loc. cit.*



Perhaps no greater revolution occurred in the relationship between man and nature—the introduction of fire not excepted—than that brought on by the introduction of science.

—ERICH W. ZIMMERMAN

How Has Our Thinking Expanded?

DURING the years following 1900, we made many significant advances in our knowledge of resources. The first act of the National Conservation Commission was to take an inventory of the natural resources of the United States, an immense task long overdue. Endorsed by the governors of the states, the three volume inventory was presented to President Theodore Roosevelt in 1909.¹ Later, under Franklin Roosevelt, the National Resources Planning Board brought the inventory up to date as a means of guiding its efforts and of focusing attention on problems of resources of that time.²

These works told what we had. We began also to increase our applications of science to the needs and desires of daily living. Gasoline and Diesel engines set us on wheels. Magnesium began to be recovered from sea water. Aluminum reduction and fabrication expanded from an infant industry to a gigantic one. New uses of wood and waste fiber were developed in products ranging from rayon to newsprint made from pine. Agricultural experiment stations uncovered better strains of plants and increased our command of fruitful practices in land-

¹ *Report of the National Conservation Commission*. Senate Document No. 676, Sixtieth Congress, Second Session. Washington, D. C.: Government Printing Office, 1909.

² U. S. National Resources Committee. *Regional Planning*. Washington, D. C.: Government Printing Office, 1936-1943. (Twelve parts.)

See also, J. Frederick Dewhurst and Associates. *America's Needs and Resources*. New York: The Twentieth Century Fund, 1947.

use and land management. In biology, the science of ecology, concerned with laws of relationships among parts of the environment, received increasing attention. The social sciences contributed the approaches of cultural anthropology, economic geography, and regionalism as points of view from which to study relations between man and his environment. As never before, we were becoming equipped with knowledge of our environment and control over it. We reached a climax of this control when, for purposes of destruction, we unlocked the atom in a searing flash over Hiroshima.

The People Learn

Some research results found their way into books intended for popular information so that wise use of resources could be understood by all. The inventory of national resources, reported by the National Conservation Commission in 1909, was followed in 1910 by the publication of the *Conservation of Natural Resources in the United States*, prepared by Van Hise of the University of Wisconsin. For twenty years it was the standard text in the field.

With the 1930's, and the revived interest in our economic problems, several books of general interest followed in quick succession. Van Hise's book was revised and largely rewritten under the editorship of Loomis Havemeyer of Yale and republished in 1930 as Van Hise and Havemeyer, *Conservation of Our Natural Resources*. In 1933, Erich W. Zimmerman of North Carolina published his exhaustive *World Resources and Industries* which set forth a valuable conceptual framework as well as extensive information on resources. Odum's *Southern Regions of the United States* appeared in 1936 to document and analyze a whole region. *Our Natural Resources and Their Conservation*, edited by Parkins and Whitaker, became a standard college text on its publication in 1936. J. Russell Smith in 1937 presented an economic ge-

ography, *Men and Resources*, which emphasized "intelligent use of resources in contrast to the wasteful practices of the frontiersmen."³ In more specialized fields but designed for popular information, were books like Sears' *Deserts on the March* (1935), and *This Is Our World* (1937), which provided popularly written but scientifically sound treatments of ecology in American life; and Chase's *Rich Land, Poor Land* (1936), Lord's *Behold Our Land* (1938), Shepard's *Food or Famine* (1945), which dramatized with poetic vigor the plight of our soil and steps needed to restore it.

Hoarding—a Misconception

These many efforts brought the subject of conservation vividly to the attention of the American people. They also materially advanced the ideas underlying thought about resources and, therefore, pointed to new guides for action. From 1908 on, conservation as a movement had recognized that its purpose was wise development and use of resources with consideration for both present and future needs. Unfortunately, it sometimes came to be considered in the public mind as primarily concerned with *reduction* of use—an effort to limit and slow the nation's withdrawals from its bank account, and in extreme cases, to freeze that bank account from further use. As late as 1936, Wallace W. Atwood felt it necessary to state: "Conservation does not mean restriction from all use. . . ."⁴ W. A. DuPuy had needed to state in 1932 that "Conservation does not mean the hoarding of natural resources for a hazy indefinite future. . . ."⁵ Altho writers on conservation struggled to overcome this misinterpretation, it continued and may have caused Franklin Roosevelt first to

³ J. Russell Smith. *Men and Resources*. New York: Harcourt, Brace and Co., 1937. p. v.

⁴ Parkins and Whitaker, editors. *Our Natural Resources and Their Conservation*. New York: John Wiley and Sons, 1936. p. 19.

⁵ R. L. Wilbur and W. A. DuPuy. *Conservation in the Department of Interior*. Washington, D. C.: Government Printing Office, 1932. p. 154.

choose the title National Resources Board and later National Resources Planning Board for a board whose functions in many respects corresponded to those of the National Conservation Commission of Theodore Roosevelt.

Part of the misconception undoubtedly arose from federal and state efforts to place greater amounts of land under governmental control. Part may have derived from passage and enforcement of game laws which limited the take of hunters and fishers so that supply could be maintained. Part may have come from those who preferred continued exploitation and therefore tried to mislead the public into a belief that conservation efforts would lower standards of living in the present as we saved our resources for the future. But it seems likely that interpretation of conservation as hoarding was based on a belief that all resources are static, are a fund which can be drawn upon until exhausted. Our major concern would then be to so control the rate of withdrawal that our needs and our children's needs could be satisfied. Concern of conservation action with inventorying resources—that is, counting the funds of available resources—altho highly important, must have helped to crystallize this belief.

Use—the Prime Determiner

This static view of resources was brilliantly opposed by Zimmerman in his *World Resources and Industries*. Looking at the many changes in our use of our environment—seeing, for example, that for the American Indian coal was not a resource since it was not used, but that for the present American coal was a major resource—Dr. Zimmerman developed the concept that resources were not blocks of material which can be counted once and for all. What made a resource a resource was man's use of it. "A man-less universe," he said, "is void of resources; for resources are inseparable from man and his wants. They are the environment in the service of

man."⁶ By this concept, he identified more clearly than had yet been recognized that resources are dynamic, and that their significance constantly changes as science and invention creates new means of satisfying old wants. Science is man's tool in changing his environment, in creating new resources or modifying old.

Emphasis on *use* as the essential character of resources pointed the way to expanded thought on conservation. Man's wants are satisfied thru use of certain parts of the environment. If these parts can be transformed more efficiently to man's use, the value of the part as a resource is increased in direct proportion. Electric generation plants which create a kilowatt-hour of electricity from less than one pound of coal triple the resource available to older plants which required three pounds of coal for the same purpose. A foremost step in wise use of resources is therefore to apply scientific research to discover more efficient ways of using resources.

A corollary step toward wise use of resources is to prevent waste. Methods of lumbering where 40 percent of the tree may be left in the woods or of oil extraction where gas is burned and much oil unrecovered, clearly affect man's ability to satisfy his wants. The interpretation here is in accord with the conservationists who inveighed against waste. However, emphasis on wise use offsets the misconception that conservation planned to brood like the Wagnerian dragon Fafnir over a hoard of golden resources. "... conservation means more than simply putting on the brakes on the production of minerals and other material objects. Insofar as conservation is tied up with economy, it can result from economy of use as much as from economy of output."⁷

Finally, the strategy of conservation must emphasize the need for detailed understanding and careful choice of re-

⁶ Zimmerman, *op. cit.*, p. 3.

⁷ Zimmerman, *op. cit.*, p. 792.

sources. The first principle is to use the resource for what best suits its peculiar properties; the second is to use those which can be renewed or which are inexhaustible.

"Resources should be devoted primarily, if not exclusively, to those uses for which they possess peculiar or particular qualifications. . . .

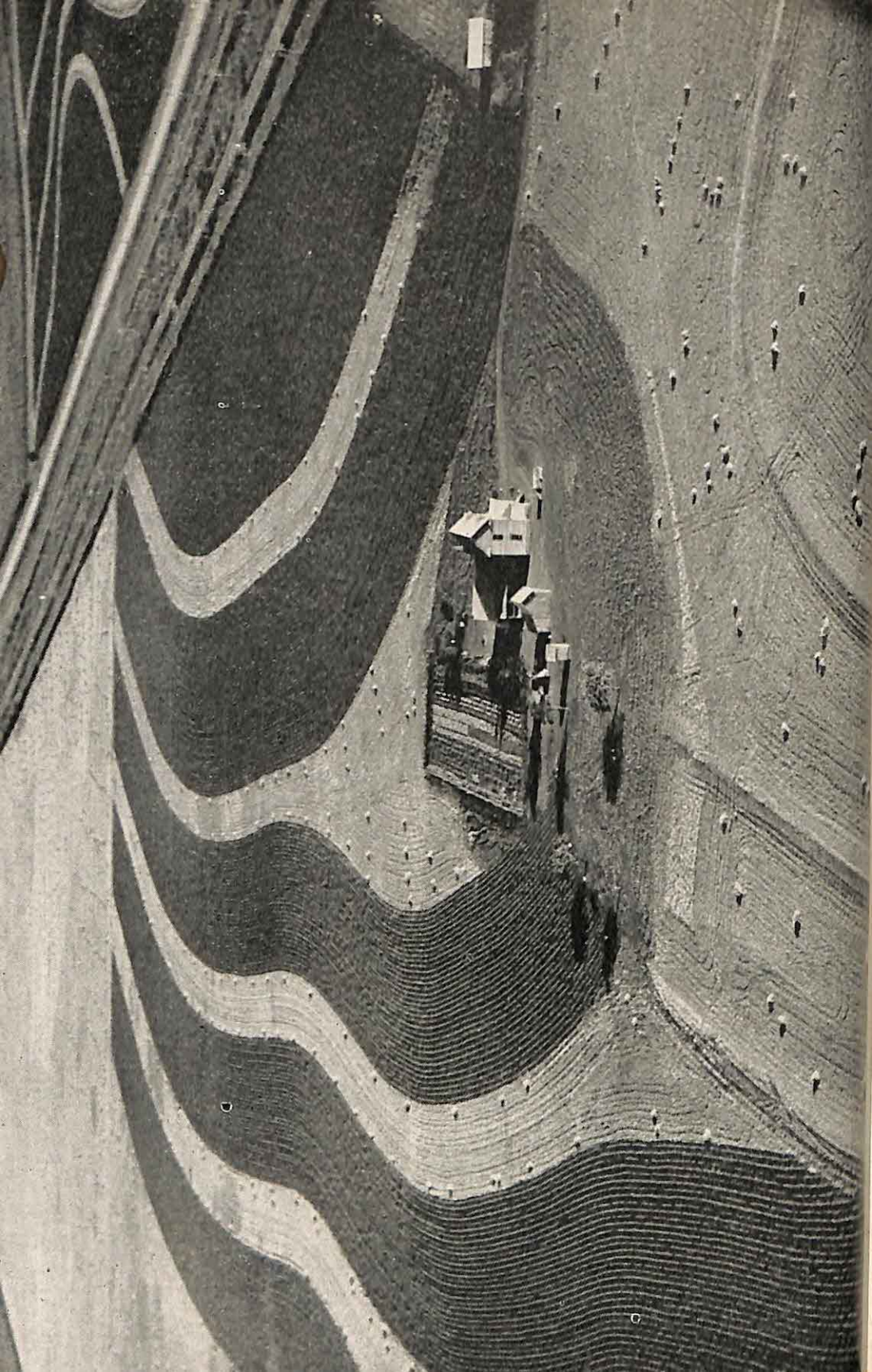
"In the second place, strategy of resource utilization decrees a preference for flow resources—vegetation, water, sunshine—over fund resources. . . . The priority system can be elaborated by differentiating fund resources on the basis of absolute scarcity, possibilities of recovery, rate of exhaustion. . . ."⁸

These were real advances. The idea that resources receive their character from use pointed the way to need for research and planning as well as tabulation of resources. Inventories could have exact meaning only at a single point in time, because resources changed as rapidly as man's needs or technics changed. Every advance in efficiency, in reduction of waste, and in *increased* use of under-developed resources, increased the amount of resources available. Development of use, *when needed*, becomes as important as careful use. And all use is to be guided by the characteristics of the resources themselves. Each is to serve its unique purpose, wherever possible. Inexhaustible and renewable resources are to be preferred to exhaustible resources when substitution is economically and scientifically feasible.

Balance—the Heart of Wise Use

Dr. Zimmerman stressed the dynamic character of resources and their identity with use. Other writers of the twentieth century thru a wealth of research have emphasized anew the principle of balance—a principle which lies at the heart of wise use of resources. That the natural environ-

⁸ Zimmerman, *op. cit.*, p. 792-93.



ment restored to the soil what plants removed from it had been apparent for years. Animal manures from time immemorial replaced soil minerals withdrawn by cropping and pasturing. John Lorain of Pennsylvania, writing in the 1820's, on *Nature and Reason Harmonized in the Practice of Husbandry*, stated the principle in terms of agriculture:

"The fertility of it [soil] might be preserved and increased . . . if a system of agriculture calculated to keep the ground fully replenished with decaying animal and vegetable matter was practiced, and due attention was paid to the augmentation of live stock, in proportion to an increase of ability, instead of the ruinous practice of perpetual ploughing and cropping."⁹

Lorain was thinking of agriculture alone. Later scientists thru gradual accumulation of fact built a science of relationships—ecology—which brought together information from many sources, but emphasized above all else the interdependence of the natural environment and of the life upon it.¹⁰

Paul Sears stated the principle in simple words:

" . . . we have not yet built into our culture an understanding of a great law which operates as strictly as the laws which govern the combustion of gasoline or the turning of a flywheel. This law is called the Law of the Balance of Nature. . . .

" . . . soil and living community are each an expression of the other. Together, although perhaps not often at the same rate, they progress toward a condition of final balance and stability. This is literally a climax, which represents the best and most efficient organization of which each is capable under the given conditions. Once reached, and left undisturbed, it maintains itself."¹¹

⁹ Quoted in, *Early American Soil Conservationists*. USDA, Miscellaneous Publication 449, October 1941. p. 22.

¹⁰ See, for example, W. C. Alec. *Animal Life and Social Growth*. Baltimore: Williams and Wilkins, 1932; W. B. McDougall. *Plant Ecology*, Philadelphia: Lea and Febizer, 1927; A. S. Pearse. *Animal Ecology*, New York: McGraw-Hill Book Company, 1926; Paul Sears. *Life and Environment*, New York: Teachers College, Columbia University, 1939.

¹¹ Paul B. Sears. "Man and Nature in the Modern World." *Education for Use of Regional Resources*. Washington, D. C.: American Council on Education, 1945. p. 31-33.

The principle applies to water, land-use, land management, energy, and materials. Each of these areas is susceptible to planned action which maintains as nearly as possible a new balance to replace the natural one.

"The materials needed by living things must be used over and over again by succeeding generations. This pattern of use, return, and re-use is called a cycle, and a knowledge of such cycles is the basis of wise land-use and management. By respecting them, we can maintain a balance with nature; by disregarding them, we disrupt the balance and impoverish ourselves."¹²

Respect for the balance of nature suggests, or rather demands, that the goal of resource-use is sustained yield at the highest level. Foresters now speak of "tree farms," where rate of cut does not exceed rate of growth, and the cut is made in such a way as to increase rate of growth. An artificial cycle is established even in minerals such as iron thru the recovery and reuse of large amounts of scrap iron and steel. Our use of coal and oil is being supplemented by increasing amounts of hydroelectric power, dependent on the hydrologic cycle of rain and stream flow. As we develop our dependence on resources which can be used and reused, or which can be used within a continuing balance, we increase the chances that our civilization will be permanent. We have already been warned: "A civilization based on a fund of exhaustible resources cannot be permanent; it is necessarily a passing phenomenon in human history."¹³ The scientist, by pointing to the law of balance of nature, added a major concept to the arsenal of conservation. Wise use of resources, it soon became clear, depended on shrewd understanding of relationships among life and environment. No resource can be considered by itself. Each must be considered in relation to all others.

¹² Sears, *loc. cit.*, p. 41.

¹³ Zimmerman, *op. cit.*, p. 71.

Regional Planning — a Major Approach

A third major concept added to thinking on resources was regional planning. Stemming largely from the University of North Carolina's social studies program, the concept of regionalism became a useful tool for research and planning. Briefly stated, scores of economic, cultural, and geographic indexes were used to establish the fact that certain states formed themselves into groupings in which the member states were more like each other than like states not of that group. The concept made it possible to plan effectively for a region, because of the region's internal similarities. Research and planning on a regional basis could then supplement state planning which was often based on too small an area in which to find adequate solutions. To a degree it would localize national research and planning, which often would be based on too wide an area to be caught up into action. In speaking of regions, Dr. Odum states: "Here are groupings of states, tending to constitute relatively homogeneous areas of culture and geography."¹⁴ Development of better ways to deal with social problems must come from a regional approach:

"The merits of the regional approach to national study and planning inhere not only in this greater probability of attaining a national and interregional balanced social and political economy, but also in the opportunity for a better understanding and more effective and orderly development of each regional unit based upon essential differences, capacities, needs, fitness."¹⁵

The region should become the center of attention because its similarities make it possible to deal with it as a unit. It is large enough to encompass the major factors in modern life. It is small enough to provide a basis for study and joint action among states.

¹⁴ Odum, *op. cit.*, p. 247.

¹⁵ *Ibid.*, p. 251.

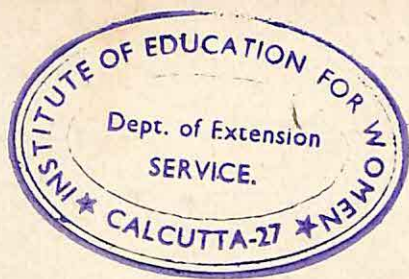
It should be crystal clear, however, that these analyses did not point toward the division of the United States into opposing principalities. "... regionalism envisages the nation first, making the national culture and welfare the final arbiter."¹⁶ The ultimate goal of regionalism is regional balance, in which each region contributes its best development to national welfare.

The importance of regionalism to wise use of resources is great. Resources have a locus, a place. Regionalism suggests that study of resources and action taken on them begin with the region, and look from it to the national framework in which all regions rest. Regions are not self-sufficient, but their natural resources, their urges and drives, their culture, their problems are sufficiently uniform to make agreement on ends and means feasible and joint action possible. "The significance of the idea of region, however, lies not in the definition . . . but in the search for unity—unity in a common cause for work and action."¹⁷

Emphasis on usefulness as the distinguishing characteristic of resources, on the balance of nature as the guide to establishing principles of resource use, on regional planning as a major approach to solutions of problems in American life, were significant new ideas. They so broadened the ideas lying within conservation that the southern states began to call their educational effort in the field *resource* or *resource-use* education rather than *conservation* education. The purpose was the same—to build a better life now and in the future from the materials at hand. To do so, knowledge of the major principles of wise resource-use is needed.

¹⁶ *Ibid.*, p. 253.

¹⁷ Gordon R. Clapp and W. J. McGlothlin. "Steps Toward Regional Development." *High School Journal*, May 1946, p. 109.



First, and most essential, we must know the physical realities which we face. Too long we have reckoned our resources in terms of illusion. Money, even gold, is but a metrical device. It is not the substance of wealth. Our capital is the accumulation of material and energy with which we can work. Soil, water, minerals, vegetation, and animal life—these are the basis of our existence and the measure of our future.

—PAUL B. SEARS

What Principles Shall Guide Us?

WISE resource-use can come only as people understand what resources are, how they are classified, and what principles govern their wise use. Resources are not a homogeneous mass from which man chips off certain parts for his use. Each has its own characteristics.

Fundamentally, of course, all our natural resources are built from elements. We have now isolated ninety-four of these building blocks, but actually, only a relatively small number, some twenty-odd, are of major significance in man's existence. Others may become more significant as research finds new uses. Uranium, until recently, seemed an unimportant name. Now it is on everyone's lips, since it holds the key to world control. The significance of elements is that they form the bases of our existence. They make the world in which we live.

We use elements in one way for materials. We use them in their elemental state as iron or aluminum or copper. We use certain combinations of elements as building stone or wood or cotton fiber. But we also use elements and combinations of elements to give us energy. The element carbon in coal or gasoline unites with the element oxygen releasing heat and light. The sun transforms one element—hydrogen—into another—helium—and the process releases enormous quantities of energy. The uranium atom or the plutonium atom splits in two, again releasing energy. Man's search throughout the ages and more particularly from the industrial revolu-

tion on has been to find new and better sources of energy. His release from drudgery and his building of a civilization have been based on his ability to find and use energy, and to find and use materials which will translate that energy into forms useful to man.

All useful elements and useful combinations of them are not distributed evenly over the earth's surface. Some elements are present in inexhaustible supply and are distributed widely. No matter what we do we cannot increase or decrease the sunlight as such. We have limitless stores of nitrogen, oxygen, and hydrogen in air and water. Carbon is present in every living thing. Magnesium is diffused thru all the seas and aluminum is in every clay. But others are less plentiful, and less well distributed. You have only to see the contrast between an irrigated farm and surrounding desert to realize that lack of water, even tho inexhaustible in the world as a whole, may sharply limit the amount of sun that can be captured by plants for man's use.

If every element and every useful combination of elements were present widely in unlimited supply, we should have no problem. But the problem is clear, because certain resources are limited and maldistributed. We can destroy the usefulness of others. Luckily, science has been able to identify certain general principles governing wise use of resources. They are significant guides for action. For, if individuals and nations first understand and then act upon the principles of resource-use, they can reduce the intensity of their problems. By full understanding and intelligent action we can overcome the difficulties H. A. Meyerhoff describes in the January 1947 *Annals*:

"In a country as richly endowed with natural resources as the United States, it is difficult to persuade our statesmen or our politicians—or, for that matter, the public—that raw materials have been so vital in shaping our development and history that they must be a primary consideration in the determination of domestic and foreign

policies. . . . But our civilization is predominantly industrial and from the moment the industrial revolution started, certain key resources predetermined the destinies of nations, though many other factors have modified the rate and the quality of progress which individual peoples have made."¹

No definition of principles of resource-use can be wholly satisfactory. Every new fact discovered about the way resources act and about the extent of resources available may be sufficiently important to change the principles as they are defined at any one time. And the relative significance of each principle may vary from moment to moment. With this caution, let us look at what some of the more important ideas are behind the use—the intelligent use of the resources that are ours.

Some Are Exhaustible

Some resources as air, water, sunlight are inexhaustible; some such as minerals, oil, and natural gas are exhaustible; some such as forest, wildlife, and soil are exhaustible, but are, within limits, renewable.

This first principle suggests a strategy of resource-use, by grouping resources into classes. Air, water, and sunlight are considered inexhaustible resources because they are available in what appear to be unlimited amounts. To be sure, water may be too abundant, as in the tropics, or it may be too scarce, as in the deserts. Even tho inexhaustible in the world as a whole, therefore, water may be exhaustible locally.

Minerals, oil, and gas are exhaustible resources because their formation is so slow that it can never keep pace with use. Coal deposits were formed under geologic circumstances which will probably not recur. All such resources are therefore funds, which have precise and definite limits to their

¹ H. A. Meyerhoff. "Some Social Implications of Natural Resources." *The Annals of the American Academy of Political and Social Science*. January 1947. p. 20.

amounts. Furthermore, they are not distributed evenly. Some of them are the fortunate possession of relatively few countries. But whether or not they have needed exhaustible resources within their own borders, industrial nations of the western world have been built largely upon the fund resources of iron ore and coal. So long as we continue industry, we cannot stop using fund resources. We can find ways to reduce waste caused by overproduction or by inefficient consumption. To some extent, particularly in the metal minerals, we can create a cycle of use and recovery for further use thru collection and refabrication of scrap. But we cannot prevent ultimate depletion of these exhaustible resources.

Resources like trees, wildlife, and soil are renewable because if we use them wisely, natural growth creates an "income" which can be used without destroying the goose which lays the egg. We can use and have these resources continuously if we follow the natural laws which govern their growth. We can, on the other hand, so misuse them that for all practical purposes they are not renewable but are exhaustible. The forests of northern Michigan have never recovered from the hand of the early lumberman. The soil of Georgia, in parts of the state, has been so harassed by misuse that it can no longer provide the elements needed to sustain plant life. The dust storms of the 1930's created "deserts on the march," and left wide areas scarred to the hardpan below the topsoil, virtually powerless to sustain further growth. The bison and the passenger pigeon, once sources of food and clothing, are no longer. We can destroy beyond recovery, but by wise management we can use and keep our renewable resources.

All Depend on Each

Each part of the natural environment is interrelated and interdependent with other parts. Man, in using the natural

environment, must recognize and be guided by those inter-relationships.

The whole of the natural environment, when undisturbed by man, is interlocked by relationships which support its various types of life. Plants are dependent for growth upon air, sunshine, water, and a variety of minerals in the soil. If the plant-grower does not recognize that the plant itself is required for further growth from the soil since its unused stalk is needed to build humus, he has missed the interrelationship and the fertility of his soil suffers. Some parts of the environment, particularly the minerals, do not participate largely in supporting life in the natural state. They seem to be inert masses awaiting the use that man makes of them. Iron ore deposits are of much greater extent than the small amount of iron needed to grow plants. When man begins extracting even such resources, however, he makes a choice among the uses of the environment. If he strips mines for coal, without regard to other resources, he will often destroy the land for agricultural use. He may pollute the streams thru allowing tailings from the mines to seep into the waters to such an extent that all stream life is killed.

Some animals depend on plants for food; others require both animals and plants; still others may live only on animals. Man himself uses plants and animals for food, plants for shelter, and plants and animals for clothing. He uses increasing amounts of minerals in various forms for clothing and for shelter. But the most startling example of interrelationships is probably between land and water. In Ohio, corn growing, with its clean cultured rows, has let the top soil be carried away with the rain. Since water has flowed over the soil, rather than thru it, the level of underground water has dropped a foot a year for forty years. Further industrial development is limited by the loss of water supply. And at Cleveland, miles away from many of the Ohio farms, commercial fishing be-

comes less and less profitable because the stream-borne silt from those Ohio farms muddies Lake Erie, so shading marine plants that they can no longer receive the sunlight needed to sustain them. Water is lost to industry, fish are lost to commerce, and the topsoil on which the farm income of Ohio rests is lost beyond recovery.

New Balance from Old

The natural environment, if undisturbed by man, tends to move toward a balance or equilibrium. To satisfy his needs, man must disturb the natural balance; but wherever possible, he must attempt to establish a new balance, from which his needs can be supplied but which preserves the factors which create the resources he uses.

As we saw earlier, the idea of the balance of nature is a major contribution to the scholarship on resources. Nature, if undisturbed, tends to move toward a community which maintains itself indefinitely unless major climatic or geologic chances occur. Plant and animal life adapt themselves to their environment—to conditions of climate, soil quality, water supply, slope, or drainage. Those which cannot adapt are eliminated. While plants live on the soil, they also return to the soil, and continue its fertility. As they die, they create a type of soil which will support the next plant generation. Their life and death create an unbroken cycle of life, in which increasingly efficient forms of life find their place. The sun's energy is the major "outside" force which moves the cycle onward.

In much the same way, the soil-water-plant-animal cycle or balance operates. Green plants take energy from the sun; carbon, hydrogen, and oxygen from the air; hydrogen and oxygen from water; and minerals, such as calcium, phosphorus, and potassium from the soil. Thru chlorophyll and the sun's energy, they combine these various elements for

animals and bacteria, which convert them back to energy and minerals required for their growth. In turn, the animals and bacteria give to the soil waste products, which contain minerals and nitrogen that are needed for plant growth.

Wildlife, too, is under a system of checks and balances in which certain species consume each other. Generally, no one kind of plant or animal life, no matter how great its powers of reproduction, holds sway over all other things in the natural state. Other species and limitations of food supply prevent dominance of one species.

Water operates in the natural state as part of a cycle. It falls as rain on trees and plants, some of it soaking slowly into the ground, and some of it used by the plants and animals. The rest gradually filters thru the earth, replenishing springs as it goes, and finding its way into clear streams. Its momentary home is the ocean, from which it lifts into the skies as vapor to be again deposited on the land as rain.

Man must disrupt the natural balance to his own ends. He has learned to use parts of the environment which are inert under natural conditions. But only at his peril does he ignore the fact that sustained life is dependent on the principle of balance and on the cycle of the environment in which he lives.

"Fields of crops we must have. But we must, by understanding the great law of nature's balance, so manage them that we maintain something reasonably like it. A great farm planted for year after year in wheat or cotton, even with fertilizer, does not do this. But a farm whose fields are selected with discrimination for plowland, pasture, and wood-lot, and whose plowland is given rest and recuperation as well-managed rotation pasture, with liberal use of legumes and proper mineral fertilizer, can and often does approach a condition of balance and order. Such a farm is marked by sustained yields, by soil retained in place and enriched, by healthy livestock and human occupants. And in terms upon which our culture happens to set a very high value, such a farm is the best kind of a business investment. It

appreciates with the years, whereas the one-crop enterprise depreciates rapidly."²

If man is to establish a new balance, he must obtain an intimate understanding of the materials and energy he uses and a firm belief in the need for maintaining the sources of supply. He must take into account the natural conditions of the land he uses, how easily it erodes if farmed, how effectively the use made of it preserves as well as uses it, how the essential elements removed by use can be replaced. He will probably learn to use the natural checks and aids of the environment itself to his purposes. He may place earthworms in his garden to tunnel the soil and to transmute the humus into fertilizer. And he will above all use as fully as he can those parts of the environment which are either inexhaustible or renewable, so that his use either makes no significant difference in the available supply or is limited to amounts which can be replaced. He will attempt to create an artificial cycle for exhaustible resources, reclaiming those which he can, and increasing the efficiency of production and use of the "one-use" resources, such as oil and gas.

Capture That Energy

Energy most readily available to man comes originally from the sun. Other sources, such as atomic fission, may become increasingly important. Man must capture as large an amount of energy as possible, and must search for new sources, in order to satisfy constantly growing needs for energy other than that of his own body.

Only about 2 percent of the energy which the sun pours upon the earth is captured for man's use. The rest is dispersed into the atmosphere. If we could capture all the sunlight, we could match the energy of all our coal reserves in fifteen days

² Paul B. Sears. "Man and Nature in the Modern World." *Education for Use of Regional Resources*. Washington, D. C.: American Council of Education, 1945. p. 33.



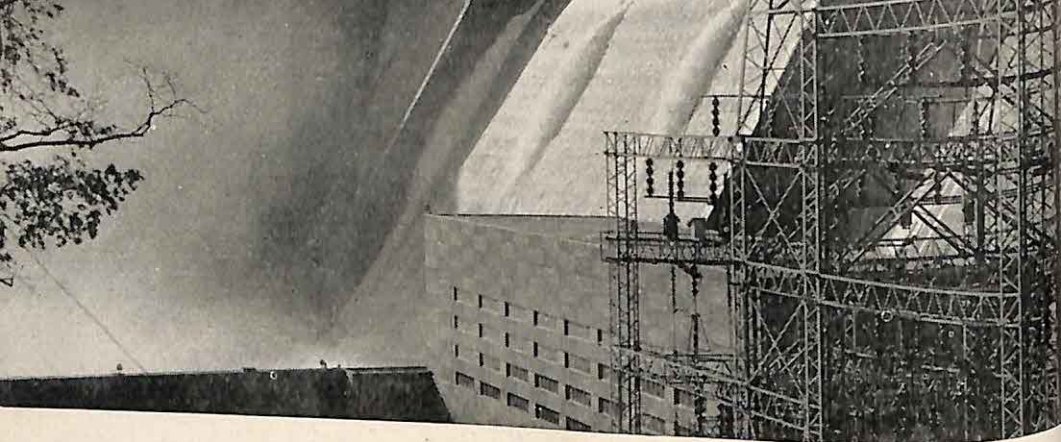
and our oil in a few minutes.³ Most of what we use of the sun's current energy is captured by plants which, with the help of chlorophyll, combine certain elements from air, water, and soil into carbohydrates, fats, proteins, vitamins, from which living organisms can unlock and use the energy the plants have stored. Under the balance of nature, this is a continuing process.

Another source of the sun's energy is falling water, continually replenished thru the water cycle. The power of falling water has long been used to turn the wheels of mills to grind grain or to saw wood. In more recent times, the power of falling water has been used to turn turbines in hydroelectric dams, changing the momentum of water into electricity, which can be transmitted considerable distances for man's use.

Plants and waterfalls are renewable and inexhaustible resources, based on the energy continuously available from the sun. The same energy has been stored in coal, oil, and natural gas, over long periods of time. It can be recovered for use by mining and drilling. These stores are, of course, exhaustible. They are of extreme significance in the development of an industrial civilization. No modern industrial civilization has been built without adequate supplies of coal, either thru ownership or importation.

Energy lies at the heart of both continuous life and civilization. Its manifestation in gasoline and electricity is clear to all. But it is sometimes less clear that a large portion of energy needed for civilization comes from plants storing energy from the sun. In the Tennessee Valley, for example, the production of electric power for the fiscal year 1943, by the TVA system, was about nine and one-half billion kilowatt-hours. The energy available in food and fiber which

³ See, H. R. Crane. "Recent Advance in the Physical Sciences." *The Annals of the American Academy of Political and Social Science*. January 1947. p. 1.



Norris Dam Generates Electricity and Stores Water, as Needed, To Reduce Floods

Tennessee Valley Authority

came from the land was more than seven times as great. Translated into kilowatt-hours, it corresponded to more than sixty-eight billion kilowatt-hours of electricity. A little less than half this amount came from food and feed; a little more than half from tree growth. "It has not yet been impressed upon us with sufficient force that though man may move to the cities, he does not thereby escape from his dependence upon the land; indeed the growth of cities and of industry increases man's need for roots in the soil."⁴ Windmills and water pipes on the roof capture other, but minor, portions of the sun's energy.

⁴ "Resources: A Basis for Understanding." *Education for Use of Regional Resources*. Washington, D. C.: American Council of Education, 1945. p. 54.



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Atomic fission is a significant new source of energy. This may in time free us from dependence on coal, oil, and gas. But different forms of energy are not wholly interchangeable. We can't eat kilowatts, even tho we can make kilowatts from food by changing wheat into alcohol and running an electrical generator with that product. Coal and wood can heat us directly or they, too, can be transformed into electricity with its multitude of uses. Our continuing dependence on the sun points the direction of our effort. It is to find increasingly efficient ways to capture that energy, and to preserve the means by which the capture is made. Man has freed himself from primitive existence only thru the capture and use of energy. He will continue modern civilization only as energy sources are maintained.

Soil, a Priceless Heritage

The way man uses soil is fundamental to the quality of his living and to the maintenance of a continuously satisfactory standard of living.

Man's need for food and fiber points directly to his use of the soil. He depends upon soil for energy needed by his own body and by the domestic animals which help to maintain him. Transfer of the sun's energy into forms useful to man uses the medium of the soil, much as the generator transfers the force of falling water into electricity. If the generator is faulty, or is permitted to fall into disrepair, obviously the energy in the falling water cannot be captured and used. In the same way, the energy available thru the sun's action on the green leaf cannot be obtained for human use if the medium of the soil is unable to sustain the life of plants. The ability of the soil to support an efficient plant life is called fertility, and our hope of maintaining our solar power plant in good shape resides in our ability to maintain and increase soil fertility.

Soil provides more than food. It also provides materials for houses and buildings, and provides clothing to conserve the energy of the body. It accounts for a much larger share of the raw materials of industry than most people suspect. Some 60 to 70 percent of the raw materials of industry, including the food industries, come from crops and wood-products of the soil.

Soil fertility, then, is a concern of all, not just of the farmer or the forest-owner. Fertility is not a simple subject. It has been the focus of continuous study by scientists, who have come to understand that fertility is a complex of many factors, including moisture, humus, bacteria, tilth (a delightful word meaning "plowability"), absorptiveness, minerals, and others. We know that application of mineral fertilizers does not of itself create or maintain fertility. It is profoundly true, however, that a small number and amount of minerals are essential to continued fertility, regardless of other factors, and this small amount of minerals, only about 5 percent of the plant's weight, can be reduced or lost thru soil wash, leaching, overcropping, or neglect.

We come back to the principle of balance. In the natural state, plants and animals returned the essential minerals to the soil. We, however, ship huge quantities of products from the soil, taking with them the essential minerals which supported their growth. Some of these minerals are not only limited in absolute quantity; they are also located in widely separated spots on the earth's crust. Phosphorus, potassium, iron, and sulfur are four of the major elements needed. They are limited. But they are the very ones, especially phosphorus and potassium, we must always have in the soil if the soil factory is to be kept in good repair, that is, if its fertility is to be maintained. These minerals permit the plant to feed on the limitless supplies of sunlight, and of the elements in air, water, and land. They form a vital list—phosphorus, potassium, cal-

cium, nitrogen, and traces of others such as sulfur, iron, boron, manganese, and cobalt. Around the continued availability of these elements, a sound program of soil fertility must be built to insure adequate living for all.

Water—for Life, Commerce, Industry, and Power

Water is an inexhaustible resource. Locally, it may be sharply limited or unavailable. It is necessary for man's own use, for growth of plants and animals, for industrial processes, for production of power which can be used to conserve exhaustible coal, oil, and natural gas resources.

The total water supply of the world is probably inexhaustible, even tho in certain locations it is so scarce as to prevent human use of the area. It is inexhaustible because it can be used over and over again by plants, which draw water thru their roots, and then diffuse water into the air. The power of falling water can be used again and again, thru a series of hydroelectric dams as the water passes on to the sea, to be returned again thru the heat of the sun and the movement of water vapor in the air.

In its primary use, water makes it possible for man to live at all. The history of civilization is a search for adequate supplies of water as well as for land. Efforts of our cities to reach farther and farther afield for satisfactory water supply were anticipated in the viaducts of the Romans. The search for water for personal use leads also to care of the land, since rapid run-off of rain falling on the ground must be prevented. Springs and wells are replenished only when rain is soaked up by the soil and trickles down into the ground. A bare field fills no springs. Industrial uses of underground water may withdraw such large supplies that wells must be driven deeper and deeper and plants dry up in the summer sun.

For personal and industrial use, water must be of satis-

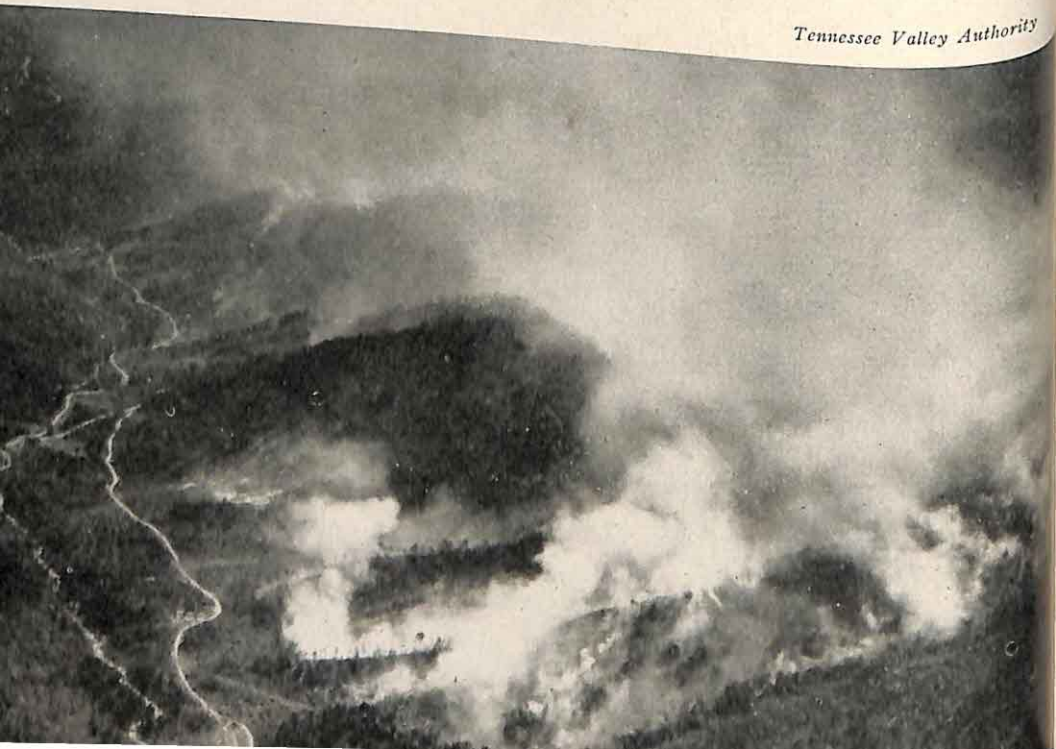
factory purity. Dumping industrial and human wastes into rivers and lakes must be offset by large expenditures for purifying the water.

Agriculture is directly dependent on water. Either thru rain or irrigation, which puts the rain where you want it, plants must receive water. Without it, they cannot obtain minerals from the soil or build their plant structure. Domestic animals also are dependent on adequate supplies of water.

But water has other major uses. It forms highways for commerce moved by shipping. It takes part in many industrial processes—in manufacturing steel, textiles, and paper, in the operation of air conditioning, canneries, laundries. Without water, both agriculture and industry perish. And to some extent, their uses are competing, particularly when they both draw upon underground water supplies. The interrelationship of resources can probably be seen as easily in water as they can in any of the resources.

Fire on Wooded Slopes Destroys Needed Wood

Tennessee Valley Authority



Finally, water is significant in the production of electric power. It can be used over and over, unaffected and undiminished. Where energy produced by water power, therefore, is used instead of energy produced from burning coal and oil, we are basing our use on a continuing source, which will not fail.

Forests No Longer Primeval

Forests are a renewable resource; forests preserve soil, hold underground water, shelter wildlife, supply material for man's use, and add beauty to the landscape. Forests must be protected from fire, insects, disease, and grazing animals. Their use should not exceed their growth.

Except for crops, forests are the major product of our soil. Forests have the valuable quality of renewing themselves if their environment remains favorable. In no other field, however, has the exploitation of American resources been more apparent than in destruction of forests. They may be renewed by planting and caring for new trees, by restoring depleted forest stands, and by instituting sustained yield forest management. Sustained-yield management merely means that trees shall be treated as a crop, that no more will be cut than can be grown. In this way the forest becomes a perpetual resource if protected from fire, disease, and insects. It continues to renew itself year by year.

This is significant not only because it supplies an unending source of wood. The forests are a crucial factor in control of erosion and of water supply. Tree roots, humus from fallen leaves and twigs, and vegetation on the forest floor protect the soil from the force of the rain, and prevent it from washing away. Leaves and branches break the force of the wind and protect the soil from the wind during the dry season. One of the ways of ending the dust bowl was to plant shelter belts of trees across the continent.

On watersheds, forests help to maintain the water cycle. They increase the amount of underground water by breaking the force of rain with their leaves and branches, so that it falls to the ground broken into smaller particles and slowed in its descent. On the ground the water is caught in the spongy floor of underbrush and moss, from which it slowly percolates into the earth and down thru it reaching to the water table.

Forests provide the habitat for much of our wildlife. When the forest goes the wildlife goes also, and all the restocking in the world will not restore it. Birds, essential to the farmer by their eating of insects, are lost. The forest suffers, and the whole biologic community feels the effect.

Our uses of wood and wood-products are almost without end. We burn trees for fuel, we shape them for shelter, we tap them for sugar, and we break them down into their parts to make dyes, paper, and cellulose. These are only a few of many uses. But they are enough to suggest that the forest constitutes a major resource.

If once we see that the forest is important to other resources and is important in itself as energy and as material, we can move toward its protection and perpetuation. Management must be based on the goal of sustained yield, so that the forest will be continued beyond a short span of years. Fire must be kept out, because fire destroys young trees and damages older ones. Harmful insects and disease must be eliminated insofar as possible. Grazing by domestic animals must be prevented because they trample and browse on young trees and pack the soil so that it does not support micro-organisms which are essential to tree growth.

Life in the Wild

Wildlife is a renewable resource of wide significance for commerce and recreation. It can be held in continuing supply

thru maintaining proper environmental balance and regulation of "take" or harvest. Legal protection may be needed to prevent destruction of species.

Our wildlife can exist only under conditions favorable to its growth. A balance of various species must be continued, since to destroy natural enemies of some species will usually cause an unchecked increase which strikes sharply against the limits of food supply available to the remaining species. But no species can live in an environment to which it is wholly unsuited. Food and cover must be at hand for animals and birds and fish. When we drained marshes and ponds all over the United States to increase our acreage of farm land, we destroyed nesting places and feeding grounds of ducks and then spent large sums in artificially restoring what we had taken away. We dump sewage in streams or cloud them with silt so that they cannot support sufficient vegetation to provide food for the fish. Furthermore, the annual "take" for commerce or sport should be limited by the rate of natural increase, if we have concern about the future. There are examples of the destruction of whole species, merely from greed, or sometimes even from just an excessive urge for killing.

More than for any other resource, our wildlife is protected by law and enforcement. Laws have been passed under pressure of sportsmen's groups who wish to see their sport continued. Their interest has sometimes conflicted with the use of wildlife for more utilitarian purposes. Sometimes, also, the laws passed have not been based on careful research, with the result that they may impede rather than further the cause for which they were designed. In Norris Lake, in Tennessee, careful studies proved that more fish were dying from old age than were ever caught. In view of this a closed season was lifted, many more fish were caught, but the supply continued undiminished.



Fruits of the Mine

Mineral resources are exhaustible and only thru wise and careful use can the supply be maintained for use.

Mineral resources are crucial to modern civilization. All are probably exhaustible at some point in time, since they are "fund" resources. We can withdraw our stocks rapidly or slowly, but there will come a time to all of them when we have no more that is concentrated enough to mine. Long before that point is reached, we shall have skimmed off the cream of the supply, and our supplies will then be obtained only at increased cost, which will be reflected in lower levels of living. To be sure, there are some minerals, particularly the metals, which can be restored in part thru recovery of scrap. We can increase our efficiency of recovery and use of all minerals, and we can find new sources of some—as we have done with magnesium thru recovering it from sea water. But the fact remains that our modern civilization is to a large extent based on exhaustible resources whose existence has a definite limit.

There are large differences in how soon or how rapidly we shall exhaust our supplies. The most crucial are those in which use is beginning to approach the end of the "fund." Some minerals are found in such large quantities and are so widely distributed that they give little cause for present concern. Calcium in the form of limestone, aluminum in clay, magnesium in sea water and in dolomite, and silicon in sand, are so prevalent that they are virtually inexhaustible. Certain metals can be partially recovered thru scrap, and the most widely used, iron, is present in the United States in quantities sufficient for centuries, *if* we are willing to pay the price of increased costs. Minerals of most concern are those of limited quantity or limited distribution. Phosphorus deposits, for example, in the United States are of sufficient size to satisfy needs for years to come, but the great bulk of these deposits

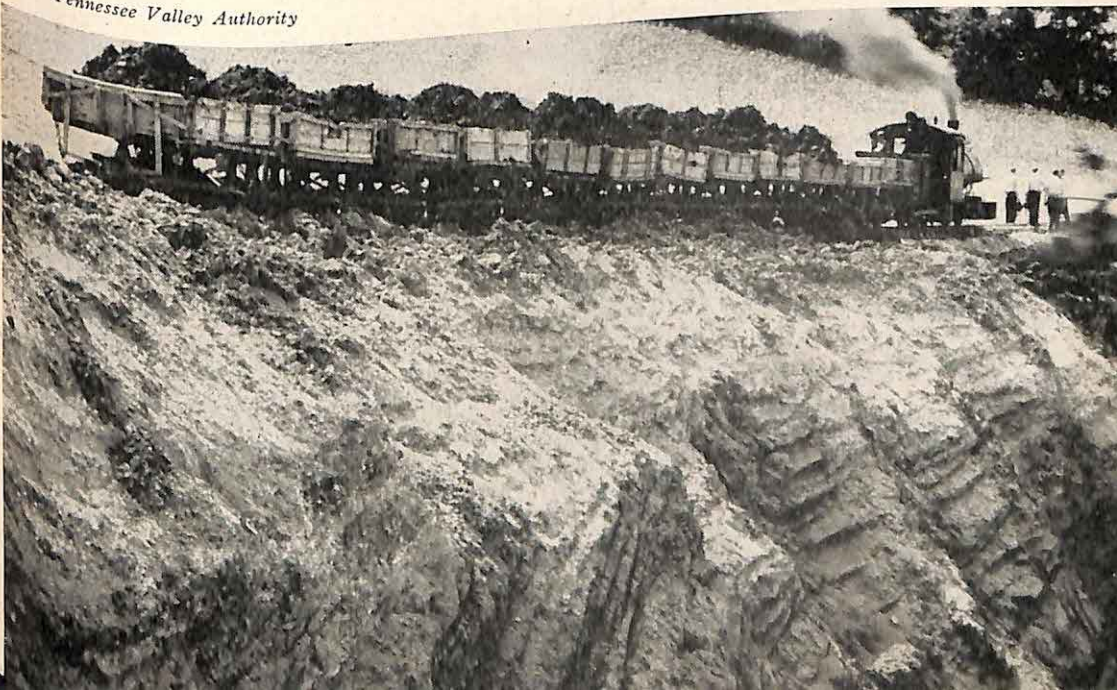
are in the Far West. In the meantime we have so worked our Tennessee deposits that they are approaching exhaustion, with their life estimated to be only thirty years more. Florida is better stocked. Eventually, however, we shall have to develop the western deposits, in spite of increased transportation costs. It will be done because phosphorus is essential to plant growth.

We have, therefore, responsibility to use minerals as effectively as possible, to avoid waste and loss in extraction, to recover scrap for further use, and to substitute the more abundant for the less abundant. It is possible that national policies will be needed to protect the sources of certain important minerals already threatened with exhaustion. Production controls may be necessary for petroleum and natural gas. The welfare of society may have to supersede the right to exploit for private gain.⁵

⁵ See, Renner, *op. cit.*, p. 50-53, in which he concludes that the "exhaustible, one-use resources," such as coal, petroleum, natural gas, helium, most non-metallics, and certain metals, must be treated as a separate class, to eliminate "competition in exploitation." He feels that this "probably means nothing short of the nationalization of such resources under a program of socialized control and administration for the general welfare."

Phosphate Mining in Middle Tennessee

Tennessee Valley Authority



The Preservation of Beauty

The natural scenic resources have great esthetic, social, recreational, and economic value. They should be protected from careless destruction.

The scenic resources of a region provide healthful recreation, satisfying our common urge for the out-of-doors. The urge for beauty appears in the great national parks, which preserve some of the natural wonder of America. At the same time, scenic resources provide many economic opportunities, thru catering to tourists with their many needs for lodging, food, equipment, and sport. Michigan's deer, South Dakota's pheasants, Yellowstone's falls, New Mexico's caverns, New England's hills, Florida's beaches, Washington's waters, draw people from all over the United States to the benefit of the regions in which they are located. An informal check several years ago in Tennessee showed that the tourist trade at that time in that one state ranked third in the amount of income it produced, falling below only agriculture and wood products.

Again the interrelationships are significant. A well-cared-for landscape, in which each resource is considered in terms of all others, has beauty. It has order. It shows a balance among its immediate and continuing uses. It attracts visitors.

Society Must Protect Itself

Man is entirely dependent upon his environment for his means of life. Wise use of resources is therefore not only a matter of individual discretion. Society to protect itself may have to exercise a prior right, if resources are misused to the extent that the welfare of the human community is threatened.

Ideally, each individual thru enlightened understanding might be expected to choose the course which was most desirable for himself and the society of which he is a part. Once he recognized the need for careful and wise use of resources,

he would guide his actions to that end, considering his own good, the good of society, and the good of generations to come. In fact, however, such an ideal can hardly be reached. Much can and must be done to inform people of the results they can expect if various choices are made. Information on the characteristics and trends of resources can be made available. Understanding of the principles of resource-use can be developed. A great deal needs to be done to assure this much.

But even if all that is done, there will undoubtedly remain those persons to whom society's or the future's good seems entirely irrelevant beside their present wish for personal gain. "Posterity?" sneered one such exploiter, "What has posterity ever done for me?" Murder has not been eliminated by knowledge that it is antisocial. On the same grounds, we cannot allow exploitation of essential national resources to remain unchecked, nor can we place our hope solely on a new generation which may act wisely and well after learning the consequences of acting otherwise. Some restriction thru law and enforcement will be needed. At what points legal restrictions on private exploitation should be placed, and where control by society may need to replace private control cannot be made once and for all. Each generation, almost each decade, must decide for itself which resources must be controlled and what restrictions must be established.

We Can Change Our Culture

A society's culture can be modified so as to permit it to be more effective in solving the problems of that society's existence. Education, advertising, science, invention, the example of respected people, and many other means effect constant change in the culture.

If it were not possible to change the culture of a people, the expectation that resources would be better used in the future would be feeble indeed. Luckily, culture is changing



Use of Essential Soil Minerals Stops the Downward Spiral
of Soil Fertility in One Field; in its Neighbor Gullies Continue

Tennessee Valley Authority

constantly as new factors enter the social environment and as new ways are found of dealing with old problems. The automobile put us on wheels, the radio brought sounds of the world into our parlor, and the airplane shrinks the globe into a day's journey. Because we can change our culture, we can hope to modify the way people act with and toward their resources, looking to the time when short-term gain will not grossly outweigh future good, and when the principles of wise use can be fully applied. At that time, we shall be able to produce a satisfactory balance between individual and social good. We have the knowledge now. We need only to make it effective in society's operation to change our methods of dealing with resources into more fruitful ways. Science will continue to discover new knowledge, new techniques, and new devices. We now have the task of finding ways to use the knowledge that is ready at hand.

In changing a culture, formal education has a large, but not an exclusive place. Schools are limited in the extent to which

they can stay in advance of the society which supports them. Without dogmatism, however, they can provide information, and transmit the proved results of experiment and experience. In so doing, they can create an opportunity of choice. Only when man knows the consequences of his action, can he make an intelligent choice between two courses of action open to him. With knowledge, he may choose a new, more satisfactory action. As that action becomes habitual, man begins to create institutions and patterns which will continue to shape his choice. Eventually, the action may become more than intellectual choice. It will be felt to be right—"in his bones." It has then become a part of a new culture.

Man—the Key to Action

Use of the environment to satisfy man's needs is conditioned by the resources available for use, the people who use those resources, the command of means by which they can be used; science and technology, and the ends which men believe desirable.

Resources by themselves are nothing. They can satisfy man's needs only as he is able to transform them to his use. In early civilization man used what came to his hand pretty much as it appeared in the natural state. Later on, he began to invent and to modify, domesticating animals, learning how to control and make fire. His climb toward the complicated technology of the present began. He invented tools and technics. He began to understand some of the laws of the environment on which he depended. As he did so, he was able to satisfy his wants with increasing ease and certainty. His wants increased, as did his numbers. Out of these many forces grew the present civilization. It is built of the elements and represents the search and struggle for materials and energy.

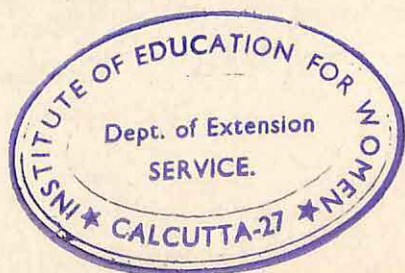
But uses to which man puts the environment are deter-

mined not alone by his skills. Even more those uses are determined by what he believes, and thinks, to be valuable. If we consider that our own generation is the ultimate value, we will have little concern for the future, even for the future of our own children. If we consider that our own individual good is the chief good, we shall attempt to accumulate wealth, or money, and therefore power clear beyond any needs of our own, largely for the purpose of satisfying our urge for dominance by controlling the destiny and lives of others. Ultimately, the wise use of resources depends upon the creed we live by, the ethics that guide our conduct, our essential sense of stewardship.⁶

⁶ For a fuller statement of this principle see, Edward G. Olsen "Educating for Social Perspective." *NEA Journal* Vol. 31, No. 9; December 1942. p. 277-79.

. . . a free and wise society must expect the educator to point courageously at the faults from which it suffers, and to seek remedies for them.

—ROBERT ULICH



What Are Schools Now Doing?

MANY schools of the United States have reflected the growing national interest in wise use of resources. A number have incorporated in their curriculums information and ideas on the environment. The elementary school has paid increasing attention to science as the importance of understanding the environment has grown clearer. Collaboration between public agencies and schools is beginning to bear fruit.

No attempt has been made to locate all school activities thruout the United States which represent special efforts to create an understanding of resources and their use. Examples have been obtained, however, of work done in various sections of the country. They are presented as suggestions which other schools may wish to consider. They are organized to illustrate instruction pointed toward the various guiding principles of resources given in Chapter IV, even tho this method of organization leaves several blank spaces.

In general, schools seem to have directed activity on resources toward providing information on specific resources of one sort or another, rather than toward understanding of the balance of the natural environment or of the many controlling interrelationships under which the environment operates. Possibly, however, understanding of balance and interrelationships is assumed, and therefore the reports received did not reflect attention to these subjects. Furthermore, much may be going on which is considered part of community study but not thought of as instruction on resources, since the

community school, as it studies the community and exercises a direct influence on the life of the community, must concern itself with study of the resources on which that community rests. It is possible that activities of such schools were not reported because teachers had mentally classified them under a different heading than resources.

Some Are Exhaustible

None of the examples of school practices gave sufficient attention to the need for a working classification of resources. Such a classification is essential because it points the way to a strategy of resource-use thru which the nation can preserve as well as use its base. Renner's classification is somewhat detailed, but an excellent beginning in clarifying action on resources.¹ The classification given in Chapter IV is simpler, and satisfactory for school purposes. That schools have not, apparently, moved to full consideration of all resources probably explains the lack of attention to classification.

All Depend on Each

Altho the fact that no resource can be dealt with in isolation is emphasized over and over again by scientists in the field, the school practices reported for this volume seldom give the idea that those teaching about resources fully transmit what is known about the relationships among various parts of the environment. The Conservation Laboratory in Ohio, described briefly in Chapter I, does place major emphasis on these interrelationships, and some of the activities reported do also. One such program comes from Virginia, where the state has had a supervisor of conservation studies in the state department of education for several years. In the Barcroft School in Arlington, Virginia, next door to Washington, D. C., the conservation studies program includes four

¹ George T. Renner. *Conservation of National Resources*. New York: John Wiley and Sons, 1942, p. 49-50.

"aspects"—Pioneer Resource Use, The Soil as the Basis of Life, Conserving Our Forests, and We Need Animals. Because the school has established such a study of the various "aspects" of resources, it is able to give some idea of the interrelationships among them. The beginning study is an attempt to compare the practices and results of the pioneers with the present state and use of resources. One activity, for example, is to make a resource map of the United States as it was in the pioneer days, and then show how different it would be now.

As the study progresses thru discussion and activities on soil, forests, and animals, the interrelationships begin to come clear. Forests are studied not only in and of themselves, but for their effects on other resources. The major purpose is stated: "To appreciate the value of forests, not only for beauty but also for utility in manufacturing, and for necessity in preserving soil and wildlife." And as the study moves on to "We Need Animals," the interrelationships are further stressed. One major objective comes to be: "To develop appreciation of the interrelationship of plants, climate, soil, and water on animal life."

Several significant results were obtained from this fairly extensive study. They are listed in terms of student attitudes and actions.

1. Developed an appreciation of the services society provides for the conservation and development of natural resources in the form of government and private agencies.
2. Helped students to recognize and know some of the characteristics of a greater number of trees, plants, and animals.
3. Led to a more authentic understanding of the origin and growth processes.
4. Made clear the theories about "balances in nature" and "survival of the fittest."
5. Led to a realization of our dependence on the natural resources for the necessities and luxuries of life.
6. Gave students a feeling of "partnership" in this big business of wise resource-use.

7. Helped to develop inquiring minds.
8. Increased the use and improvement of basic skills and creative arts.
9. Developed conceptions of interrelationships between man's use of resources and his responsibility toward coming generations.
10. Provided ideas that will have a great "carry-over" value for other phases of life.
11. Encouraged intelligent discussion on the basis of facts learned rather than on "hearsay."
12. Developed initiative and many other manifestations of best use of one's own mental resources.

A rather substantial accomplishment from a well-planned study!²

New Balance from Old

Many of the examples which were collected gave some attention to the general idea of replacing the balance of nature with a new balance which could continue to provide for man's needs. This was done thru investigations of soil fertility, sustained-yield forest management, marine biology, and several others. As these examples suggest, however, the idea of balance is most often discussed in connection with investigation of renewable resources. It has not been fully applied, as yet, to exhaustible resources where the need for understanding is at least equally as great.

Capture That Energy

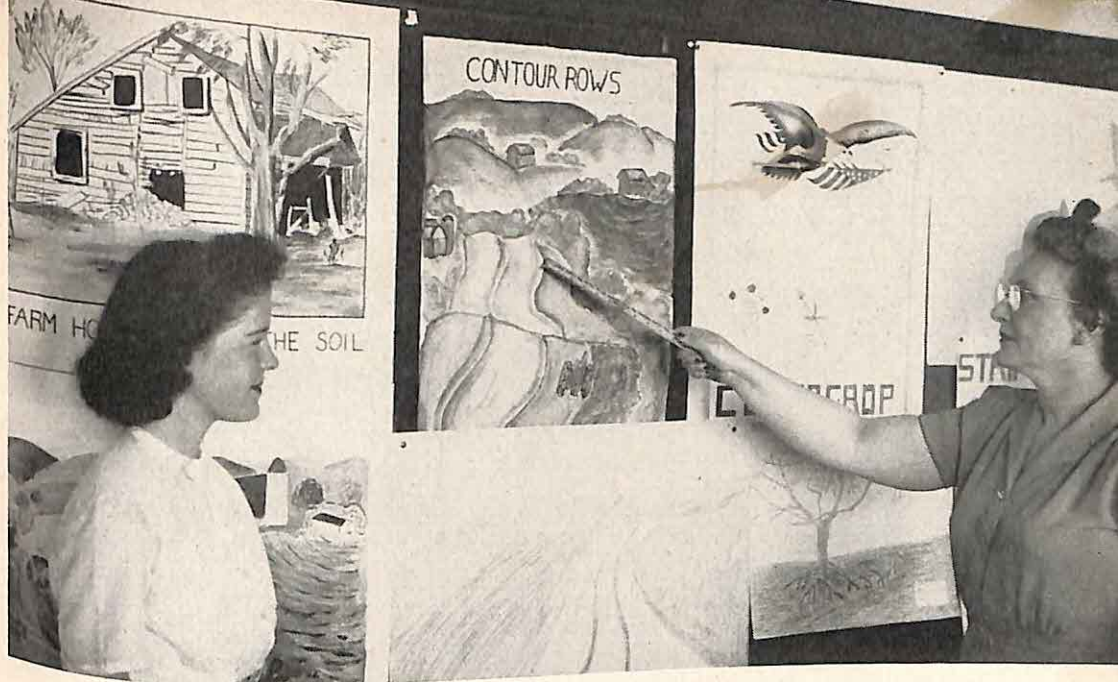
In view of the transcending importance of energy resources to modern civilization, it is odd that virtually none of the examples presented were devoted to this subject. It is possible that, again, the trouble is with words, and that few teachers consider that our energy resources are part of the broad program of conservation and development. If so, it is highly unfortunate that our thinking has been too narrow

² Adapted from a report by Janice K. Campbell, Barcroft School, Arlington, Virginia.

to encompass this significant phase of our dependence on resources. We are not yet able to think of energy as something touching each of us, possibly because the development of energy resources has been placed in the hands of large organizations whose very size deters our study and action.

A report from a chemistry teacher in Superior, Wisconsin, shows some of the difficulties of making study of energy a vital part of the school program. He explains that his high-school chemistry courses have always emphasized the importance of conserving coal and petroleum products because the amounts available to man are limited. He discusses with the class earlier methods of coke production from coal, describing in detail the old beehive method. Discussion then turns to the relative importance of the products, showing how the coke is perhaps the least important, not comparing in significance with the innumerable chemical uses of coal tar and its derivatives. The class reads widely in current magazines and assigned texts, learning that petroleum also has many special uses as a raw material for solvents, medicines, and synthetics that may outweigh its present uses as a fuel, particularly if the industrial uses of nuclear energy can be developed to the point where the world is relieved from dependence on energy "funds." Graphs are used to show location and extent of coal and petroleum deposits, and to record and present information on depletion and amount of current use. Charts from the Texas Gasoline Company, the Natural Gas Company of America, General Motors, and General Electric Company are helpful in class discussions. In spite of the variety of material used, the teacher has "not seen too much of any change of attitude in most students . . . since many of the students feel that they will never be personally concerned in this particular phase of the matter."³

³ Adapted from report by James Bradshaw, Superior Public Schools, Superior, Wisconsin.

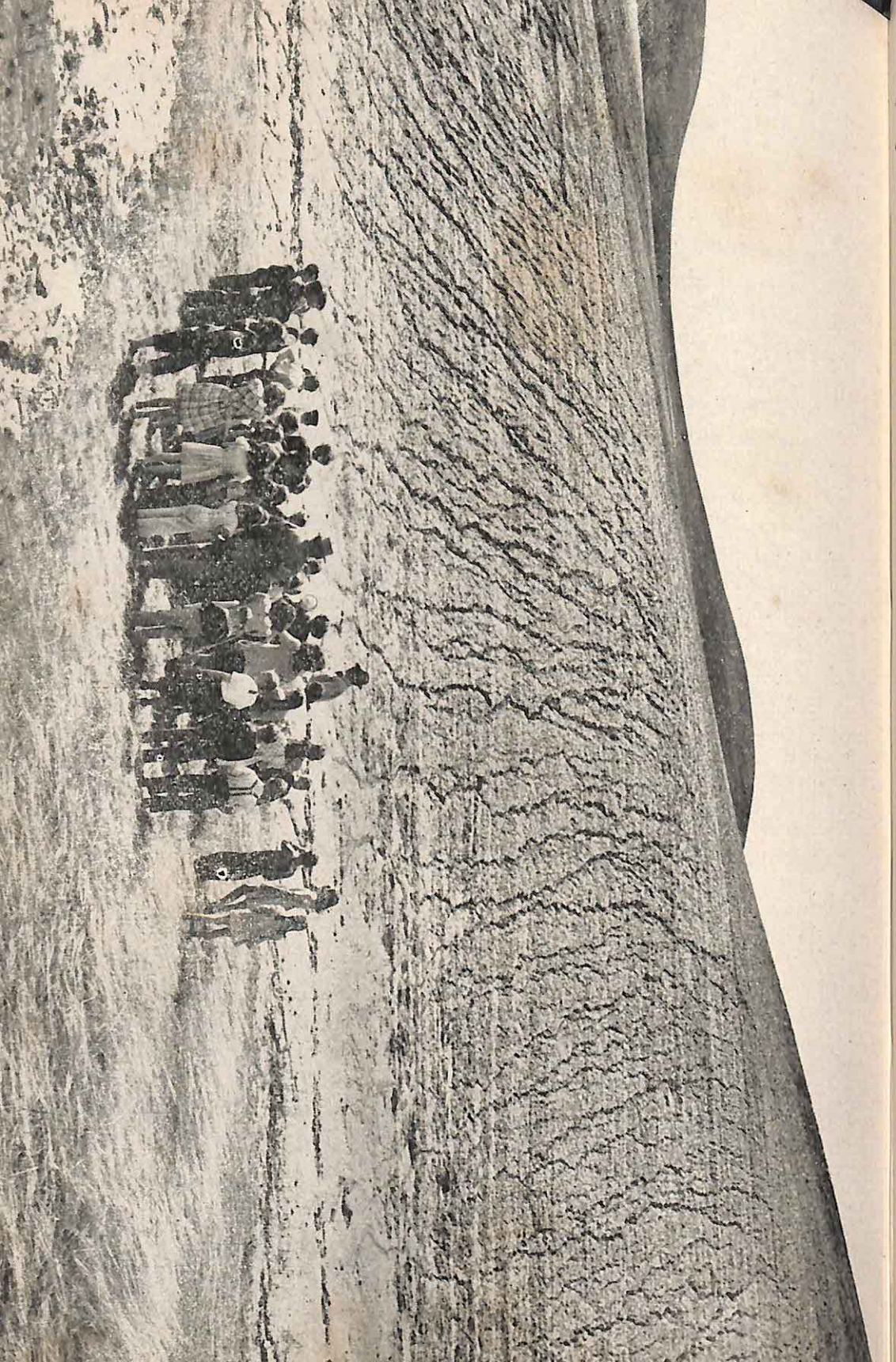


Soil Conservation Service, U. S. Department of Agriculture

High School Students in Greenville, South Carolina, Prepare
Posters on Care of Soil

Soil, a Priceless Heritage

Of the various resources considered in school instruction, soil seems to have received the greatest attention. Problems of land-use are prevalent thruout the United States, and are therefore close at hand for study by any school which extends its interest to the community. Widespread efforts of the Soil Conservation Service of the U. S. Department of Agriculture have dramatized the overwhelming dangers of unchecked erosion and the crucial relationship of soil to human life. The service has actively solicited the aid of schools and has been uniformly generous in providing materials, both written and visual, and the services of technical personnel to assist schools in study of soil. Agricultural extension agents are present in many counties of the United States, and the Smith-Hughes vocational agriculture teachers are available for consultation in many high schools. Thus, schools have a ready and active source of assistance. Their response is very encouraging.



Reality for Ten-Year-Olds

Many examples could be selected. The following is taken from a newspaper account written by C. R. Stark, Jr., who titled his piece with the unfortunate catch words, "Sugar Coated Education." It describes activities in the state of Washington.

"It was one of those late fall downpours of rain in which the children arrived at school one morning. Fred could hardly wait for the class to assemble to tell them of the small streams he had observed running down the hill-sides. 'The water was muddy just like the water we saw in the movie the other day,' he explained when the opportunity came. (A few days before the children had seen the picture 'Muddy Waters,' loaned the school by the Soil Conservation Service.)

"Yes," added Elaine, "and I saw a lot of fresh black dirt on the road that the water had piled up." It was worse in that field where Mr. Blaine burned off the wheat stubble last fall, volunteered Jack. "I noticed that there are some places on the hillside in Mr. Smith's field where the wheat did not come up this fall and the rain seems to have made deep ditches in these spots," said Ray, a thoughtful boy in blue jeans. These remarks touched off an animated discussion concerning rainfall, weather, soil, seeds, summer fallow, and erosion. "This scene occurred in a class of ten-year-olds, clear-eyed, enthusiastic boys and girls from farm and village homes, gathered together in a typical American schoolroom.

"From the interest expressed by the children thru their observations and questions, the class launched on a program of study which carried them thru the entire school year in an exciting adventure. "In their search for answers concerning rainfall and its relationship to crops and the land, they pored over world and regional rainfall maps and charts. They became familiar with the relationship between annual rainfall and native vegetation. They constructed a rain gauge and kept local weather records. They identified the characteristics of their own region. In these activities, the weather bureau furnished much valuable assistance.

"When the study of soil was undertaken, the class went on a field trip, accompanied by a local geologist who pointed out the many different soil and rock formations, such as volcanic, basalt, and

sedimentary. They collected soil samples and took them back to the schoolroom for many tests. The endless questions raised on this trip concerning the age of the rocks and their weathering required much reading and careful hard study. Fossils came in for a brief study which helped the children gain proper concepts of the age of the earth.

"The class studied native and cultivated grasses. In this connection they secured samples of the native bunch grass and examined them carefully. They collected different kinds of grass seeds and carried out experiments in germination. . . .

"As the year went on farmer fathers were called in for advice. Other field trips were organized and carried out. With them on these trips went the county agricultural agent, soil experts from the soil conservation district office, and men from the United States forest service who were specialists in the problems of grazing and forestry. A committee called on the agriculture teacher of the local high school and invited him to visit their class and help answer their questions.

"Back in the classroom, facts were gathered from books in the library and from many pamphlets furnished by the soil conservation service, the state college, and other agencies. Much use was made of pictures, charts, filmstrips, film slides, and moving pictures.

"Near the end of the year the children decided to invite their parents and friends for an evening program to share with them the results of their study. Thruout the evening committees of children explained their germination experiments and their model fields showing contour plowing, terracing, and gully grading."⁴

The year's study described in this account is interesting for several reasons. It was built on interest expressed by the children, as they related what they had seen in films to the events of their environment. It started from fairly simple facts but rapidly grew broader to include more complex information. It used the environment of the school as the basis of the study, making field trips an integral part of the school experience. It incorporated several different kinds of learning experiences, and used the expert assistance of agencies and individuals located near the school. A very wide variety of supplement-

⁴ C. R. Stark, Jr., "Sugar Coated Education," *The Spokesman Review*. Spokane, Wash.: June 2, 1946. Based on information supplied by Clark M. Frasier, director of the Laboratory School, Eastern Washington College of Education, Cheney, Washington.

tary reading and visual materials were employed. Finally, the work of the school was presented to the community so that its significance could have broader effect and the lessons learned could be better understood by the students thru organizing their information and presenting it to an adult group.

Soil for Feeding the World's Millions

A broader study is described by Anne M. Goebel, assistant professor of education at Kansas State Teachers College, Emporia. Starting from study of the soil, the students move on, following food products thru industry, relating the need for mineral elements to the fertilizer industry, studying food and agricultural habits of various countries of the world, and many other topics.

The youngsters first study maps showing where wheat is grown in the different states and where the largest quantities are produced. This leads to questions about the reason why wheat grows where it does, and to identifying the controlling factors, such as rainfall ranging from 20 to 30 inches, a growing season five to six months long, and fertile soil covering level plains. The children search for newspaper clippings about wheat, and find such streamers as:

See Wheat Peak; Wheat Up Two Cents in Chicago
Wheat Hits Twenty-Seven Year High; Dust Storms Responsible
Strong Winds Bring Duster to Kansas
Five Big Wheat Crops Changed Dust Bowl Picture
Dwindling Supply of Kansas Wheat Left for Overseas Shipping

Not only do these headlines show how wind and rain and soil loss affect wheat, but they point to its international importance and the place the United States has to fill in fighting starvation in Europe and Asia. Wind damage is of national concern also. When soil blows in the spring, before the wheat is well rooted, the whole country shares Kansas' loss.



Pictures help the children understand some of the problems the farmer faces. Contour plowing means little unless it is seen. Pictures showing contours, strip farming, and terracing are always needed, if field trips are not possible. In describing terracing, the teacher is able to show the close relationship between soil and water, so that the children can see how water under control makes the land fruitful instead of destroying it.

Fifth- and sixth-grade boys and girls came to understand readily the need for crop rotation, summer fallowing, and the practices required for dry-land farming in the semiarid section of Kansas. One member of the sixth grade asked, for example, "But what do the farmers do when their land is resting?" He was answered by another boy who had lived in the western section of Kansas, where, the boy told, the farms were large enough to allow part to lie fallow while wheat grew on the rest.

The children were interested in experimenting with soil. A government soil expert in Emporia helped the students in simple soil experiments. They also liked to see how another resource relates to the soil, particularly in the use of trees for shelter belts to break the force of wind against the soil of the plains. They saw how these trees were planted in order to serve the soil, not to be cut for lumber as the trees of the natural forest.

They also discovered how minerals make large wheat production possible thru the use of machinery moved by stored supplies of energy—either gasoline or Diesel oil. Iron ore is mixed with limestone (calcium) and heated by coal. The pig iron is transformed into steel, and made into tractors, plows, and other implements fairly near the wheat belt itself. The mineral elements join soil, water, sunshine, and human ingenuity in satisfying human needs.⁵

⁵ Adapted from a report by Anne M. Goebel, assistant professor of education, Kansas State Teachers College, Emporia.

Water in the Creek All Summer

The Vine Grove, Kentucky, High School demonstrated to its community the close relationship between soil and water. Among visitors to the school one day was R. E. Jagers of the Kentucky State Department of Education. He was so impressed by the activity of the school that on his return to Frankfort he used one of his community school circulars to schools of the state to tell the story of what he saw.

"'There was water in the creek all summer this year for the first time in several years.' This was said by James T. Alton, principal of the Vine Grove School, in a conversation with a group of visitors who had spent the preceding day in and about the school. 'So what?,' we all thought, and he continued the story. The return of the waters in the little creek which had been dry for several summers appeared to be just one of those things which just happen in the mystery of nature.

"It was a miracle in fact, but not a miracle brought about by mystery. It was a miracle—a miracle of knowledge, of education, of understanding—a miracle of faith in the good earth's kindness if it is understood, and if we cooperate with it. It was a miracle which removed a curse—a lowering of the earth's water pan where men had stripped the earth until it had become so barren that the rain water would not (could not) remain on its surface long enough that



Rural Boys and Girls Study
the Relation of Water and
Soil to Their Everyday Lives

Soil Conservation Service,
U. S. Department of Agriculture.

it could 'soak in' and maintain the water pan. It was the miracle of restoring the soil so it would grow vegetation—it could (and did) grow cover crops. It was the miracle of getting something in the soil that would delay the rain water long enough for it to sink into the earth.

"Who was responsible for the miracle? It was the principal who loved the land—understood it; and who worked with soil conservation agencies in restoring the soil. He knew how it had been robbed; knew why the stream had dried up; knew what would restore its life, and took steps to restore it. He knew that to restore the soil would give it life to grow food and at the same time the restored soil would restore the stream. Eleven years it took to produce the miracle. It was done without fanfare—just did it. How? He helped build the soil."

As teachers and principals over Kentucky read this account, they naturally turned to Mr. Alton, to ask how he had done it. His answer was that it came thru a total community program of education which used all aids available and called on the help of all agencies. Vocational agriculture, including evening school, part-time school, and day classes of the boys in vocational agriculture; the Soil Conservation Service; the Agricultural Extension Service of the University of Kentucky; the AAA; and the CCC—all contributed, and all became part of a total program of land improvement which emphasized the use of phosphates, which were purchased, and the use of lime, which was available in the community. After the two elements of phosphorus and calcium had been added to the soil, the program emphasized growing legumes (to hold soil and add nitrogen), growing cover crops, planting trees (thousands were planted in the community), terracing the land, planting strip crops, avoiding the burning of fields, and pasturing rolling land instead of cultivating it. These were steps which produced the miracle of having water during the long hot summer months in the little Otter Creek, the natural boundary on two sides of the Vine Grove Community.

Water in the creek may be unimportant in itself. But it reflected improvement in the community. The things which

"The statewide fight against the disgusting and dangerous pollution of Vermont's surface waters has enlisted the aid of the school. Students of Springfield High School have entered the fight against further defilement of lakes and streams in their territory, and are really getting somewhere.

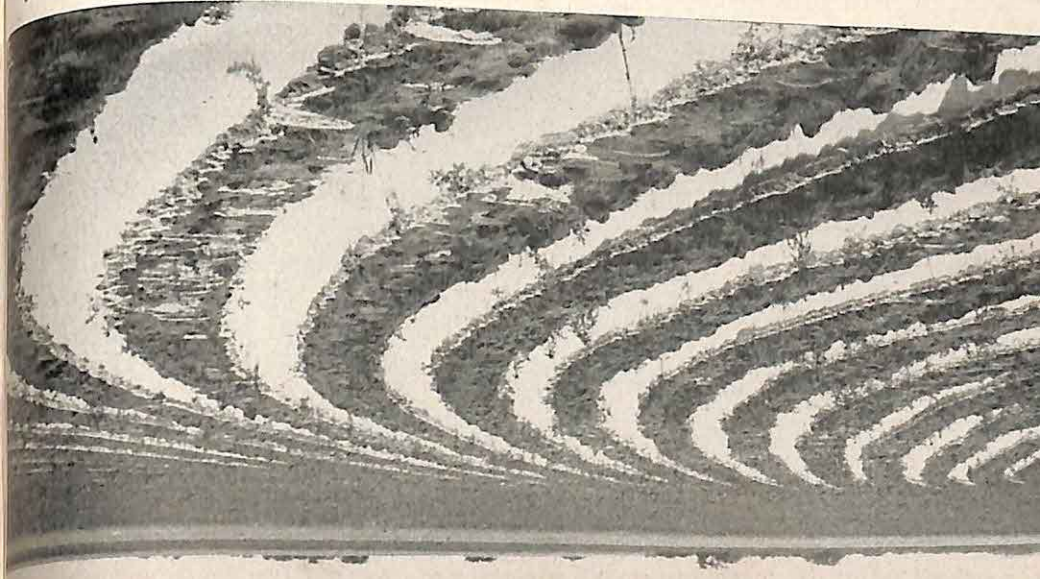
"In the spring of 1946 our school physician, Dr. F. Elmer Johnson, proposed that the biology department (by way of gaining an understanding of health problems) conduct a survey of Springfield's primitive sewage disposal system. Plans were laid during the summer, and out of a hundred students who enrolled in the department in the fall, forty-five signed up with the Stream Pollution Committee. This body took, as a project, investigation and consideration of the situation in the waters of the Black River Basin.

"Their first duty was to inform themselves fully of the problem. To do this, they assembled all the information they could from the public library, the school library, the town office, textbooks, and such sources. The teacher told all he thought they could use, and suggested activities he thought they could carry out.

"So far, the activities have taken the form of surveys and propaganda. The main impact of the latter has been on the student body, but the public is expected to be exposed. Map enlargements of the territory were made, and teams were assigned sectors in which to work. These teams recorded on their maps every source of pollution they could find along the ten miles of the Black River and several more miles of Chester Brook, Valley Brook, Clark's Brook, and several smaller streams and ponds, in country both thickly and thinly settled. Note was taken of open sewers, dumps, dead animals, barnyards, industrial waste, garbage, etc. Twenty-four samples for bacteriological analysis were taken at strategic points. These were sent to the state laboratory, as we have no incubator and it was thought well to acquaint the students with the resources at their disposal. The results, transposed to the maps, indicate the seriousness of the various forms of pollution. Thru this, we have shown that there is a real need for a clean-up of our streams that will probably involve a disposal plant for the village and a program of installing septic tanks for the country.

"Other students have utilized the services of the art department. They have made lurid posters depicting the evil, and have arranged bulletin boards with these posters and the equally colorful handouts of the state chamber of commerce. Thus, they have acquainted the

Water Stands Still in Contoured Furrows on This Oklahoma Farm
Soil Conservation Service, U. S. Department of Agriculture



were good for the little creek were the very things which were good for the soil and good for the people.⁷

This description shows some of the factors which run thru many school activities on use of resources. There is the concern with a community problem, based on the conviction that the school has meaning in the life of the community; diverse agencies of the community are drawn into an effective working relationship under the stimulus of some one of them; agencies and individuals identify needs and adopt goals looking forward to community improvement; and finally the various agencies work according to their special competencies toward common ends so that a single, direct program emerges from the former welter of disconnected effort.

Some Streams Continue To Flow

Not all streams dry up. Some continue to flow, but are called upon to carry an increasing amount of filth from our cities. In Springfield, Vermont, an attack is being made on this well-nigh universal problem, says a biology teacher.

⁷ Based on a report by James T. Alton, principal, Vine Grove (Kentucky) High School, submitted by Louise Combs, assistant director, Teacher Education and Certification, Kentucky State Department of Education.

rest of the student body with the problem, and have confirmed it for themselves.

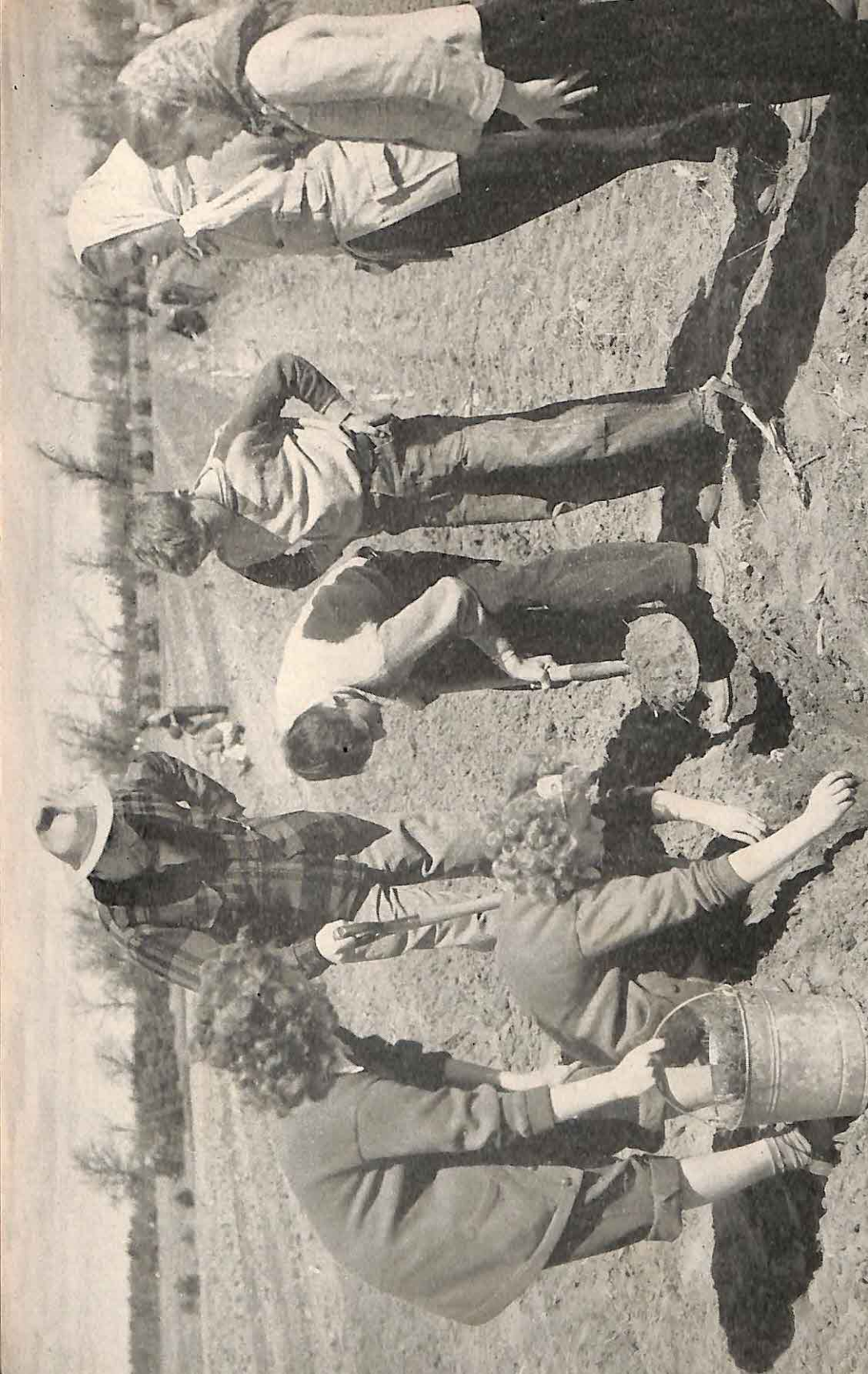
"We have shown a movie on water purification in the classroom, following the excellent visual aid suggestions put forth in the *Journal* last year. Filmstrips are available, and will be shown. Scrapbooks are being made. Essays are being written. Press relations are being established. And all of this is being done by the Stream Pollution Committee in addition to their regular biology work.

"In projects like this, certain values accrue to both school and community. The students not only feel, but put into active expression, responsibilities to the community that they will not lose before becoming voters. The community is pleased to see the students taking an active interest in what has become a live issue here. The engineering firm engaged by the village to make a survey has welcomed our cooperation. Thus, we feel that we are accomplishing something worthwhile, and that is a valuable psychological impetus in high-school education."⁸

Forests No Longer Primeval

Interest of schools in trees is of fairly long standing, partly at least because national conservation efforts have been operating on preservation of forests longer than on many other resources. Altho the school forest has a history of considerable length, its use seems to be expanding rapidly now that trees are dwindling with alarming speed. The state of Virginia, for example, has undertaken a joint program between the state forester and the state board of education under which a school forest will be established at each of the vocational high schools in the state. Landowners in the vicinity of the schools will give plots, and the schools will manage and maintain the forests. In Tennessee, a large lumber company established sustained-yield practices on its 90,000 acres of forest land so that its cut of trees would not exceed the rate of growth, and the more valuable growth would be encouraged.

⁸ John C. Pierce. "Stream Pollution Project." *Vermont School Journal*. March 1947. p. 13.



But it didn't stop there. The high school at Waynesboro set up a 34-acre school forest, given to it by the same lumber company. On this miniature tract the children coming thru the school will learn the practices which have been found scientifically and economically sound in commercial operation.

Fire Remains a Major Problem

Another type of teaching device adopted by some schools has been the fire-damage-demonstration plot. Woods burning still take a terrific and unnecessary toll of the trees of the United States. In many sections, fire remains the number one forest problem. Most of the fires are caused by carelessness; some perhaps by lack of information on what damage fire does to the trees thru destruction of young growth and the humus of the forest floor. The fire-damage-demonstration plots show the extent and significance of fire damage. A school obtains an acre of trees, whose two halves are closely similar in density and type of growth. Usually a local landowner donates the acre. A forester checks the growth to make sure that the two halves are similar, and then once a year, under a forester's supervision, one half of the acre is burned. Measurements are made each year to show the loss of growth and the plots are studied carefully to identify other effects of fire. It doesn't take long for the lesson to be made plain. As one landowner put it when asked to give an acre of trees for a demonstration plot: "Sure, you can have it. It took me thirty years to find out what damage fire did to trees. It shouldn't have to take my children that long."

Some schools have reforested cut over sections to pin down the significance of trees in community life. In the January 1947, issue of the *Washington Education Association Journal*, Frank Jones Clark of Alderwood Manor, Washington, describes activities of Washington schools in this field.

An Outdoor Laboratory in Michigan

But the most interesting example presented for this volume comes from Michigan, where the Muskegon Senior High School has used a school forest over the past six years. Preparation of a report for this yearbook was the occasion of summarizing and evaluating the experience.

In 1940 the Muskegon Senior High School acquired 120 acres of tax-delinquent land, thirteen miles from the campus for a reforestation program. The biology department welcomed the windfall of an outdoor laboratory and assumed responsibility for the program, entering into a cooperative agreement with the South Muskegon Soil Conservation District which furnished the land-use plan and technical assistance.

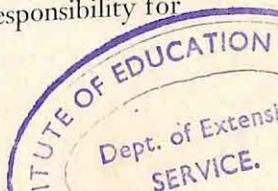
The original tract has been increased to 200 acres, most of it scrub oak. It records results of the usual Michigan history of lumbering of hardwoods, then pines, probably followed by a charcoal producing period, and then the discouraging attempt at farming—the lical bush and cellar hole are mute reminders—ending with sheet and gully erosion and the beginnings of a sand blow. A short stretch of Mosquito Creek presents a future project in stream improvement, and the bottom-land woods are rich in resources for biological study.

This report is a summary of the first six years' activity with the tract in an attempt to determine whether such a program of outdoor education holds valid learnings for city high-school students. Does it give meaning to classroom discussion on resources to the end that attitudes of thinking will carry over into the adult lives of the participants?

With the exception of our farm plan which determined our tree planting activities, the rest of our program has just grown as ideas and opportunities presented themselves. We know we have done nothing unique or unusual. This story is being repeated by many city, village, and rural schools.

For three years the program was entirely extracurricular, meaning that the work was carried on during summer vacations, after school, and on Saturday. It has continued to be extracurricular except for four afternoons a year.

Most of the participants are biology students working out 20-hour projects. The Conservation Club, however, assumes responsibility for



all forest activities and financing. The club, started because of the acquisition of the tract, maintains a yearly membership of about sixty students. About one-third are juniors and seniors who have maintained their interest since their earlier days in the department.

Biology instructors provide supervision with occasional assistance from the principal, assistant principal, and several other men on the faculty. The Soil Conservation District furnishes the technical assistance.

ACTIVITIES

Before beginning this summary we were depressed by the feeling that we had touched the lives of very few students with this activity. We have been pleasantly surprised by our own figures for the six years and dream about the possibilities if we could find more adequate transportation and build a more flexible school program. The variety of activities and learnings point up the possibilities of integration of many classes and the desirability of making such a project more than a biology department activity.

1. Tree planting—about one hundred and twenty students per year. One hundred and twenty thousand trees to date; Jack red, white, and Scotch pine. A few European larch; Douglas firs, and northern spruce.
2. Fire-land clearing—about four Saturdays per year with perhaps twenty students in each crew. The Conservation Department has assisted with fire-lane plowing and before the war we could hire near-by farmers to plow.
3. Tree cruising—once, two students with forester.
4. Tree felling, mature poplars—crews limited to six students with a student chairman go out at their leisure. This is usually a Saturday activity. The forester from the Soil Conservation District accompanied us once for instruction in tree felling and care of tools.
5. Sale negotiations for the poplar—one student.
6. Christmas trees, plantation thinning—four trips, twenty students.
7. Tree sales—ten students.
8. Advertising, price setting, selling arrangements, mailing statements, balancing books—committee of six students.
9. Insect control, cutting out pine weevil, spraying and shaking for sawfly larvae, burning for bark borers—summer work, fifteen students.

10. Nursery work—ten students. Our trees are supplied by the local nursery of the Soil Conservation District.
11. Fire fighting.
 - a. Series of six lessons with State Conservation Officer—twenty-five students.
 - b. Volunteer fighters, actual experience—about one hundred students in three years. Originally this activity was limited to boys, but girls proved such valiant fire-fighters in an emergency that they are now signed up as a matter of course. The club sends out a call for fire-fighters in September. Any boy in school sixteen years of age may sign up, and any girl in the Conservation Club. A twenty-four-hour schedule of the volunteers is kept in the school office and at the home of two instructors. This is the only activity as yet which may disrupt the school schedule. We have put one hundred students in the field within forty-five minutes after the call for help came from the Conservation Department.
 - c. Yearly demonstration of fire-fighting equipment.
 - d. We have taken several trips thru the Manistee Forest and visited the Roscommon Fire Experiment Station. Private cars are usually used for such trips with fifty or sixty students and several faculty members.
12. Soils tour of the county with soils district men—twice a year, thirty to sixty students on each trip. We make an 80-mile swing around the southeastern portion of the county, comparing our own farm with other soil areas and learning to appreciate the economic and social relationship of soil and men.
13. Use of the forest in biology class study of conservation—three hundred students per year but only one-third of them actually see the farm.
 - a. Making a land-use plan.
 - b. History of lumbering in Michigan.
 - c. Study of soils and erosion control.
 - d. Biological principles such as balance of nature, plant and animal relationships, plant succession.
14. Surveys.
 - a. Animals, by winter tracking—twenty-five students.
 - b. Plants, weekly after school trips one spring—committee of five students.
15. Trail blazing—ten students.

16. Improvement of recreation site—six students on their own time and without supervision have erected signs, built a fireplace and parking area, and driven a well. Fifteen students have built paths and bridges. Two students have sent water samples to Lansing.
17. Use for recreation.
 - a. Hunting and fishing—no record has been kept of the participants but we find much evidence that our area is popular with the trout fisherman and the deer hunter. Of course, the first concern was whether or not we should close the area for a sanctuary. A club committee met with the state conservation men to learn about sanctuaries and why our area should remain open for hunting and recreation.
 - b. Camping—boys, frequently. Boys and girls, supervised—ten students.
 - c. Picnic suppers follow each work bee. Learnings involved thru recreation—fire building in all weathers, grounds care, latrines of temporary construction.
 - d. A camping committee is making a study of camping techniques both for use "on location" and for our roving trips which occur three or four times yearly to such places as the Bernard Baker and Kellogg Bird Sanctuaries and to the State Audubon camp-outs.

In conclusion, how can one evaluate the worth of such a program? Of course, even if these school forests should happen to represent but a passing fad, the state will be the richer by several thousand acres of improved land. But the real value of such education must be in its carry-over to our adult population. Will these city students carry into adulthood a greater appreciation of the importance of conserving soil, water, forests, wildlife? Will they continue to feel at home in the out-of-doors? These are the great intangibles. Who shall measure them?

I do know that veterans home from the war go out to see how "their trees" are doing. Graduates return to help in the project. Students take their families on Sunday afternoons to see "our farm."

Outdoor education, like any laboratory education, is expensive. Yet, one doesn't become an expert typist by reading about typewriters. Nor does one learn the real value of conservation of these—our natural resources—by merely studying them from a book in the classroom.

The school forest is a laboratory which will be partially self-supporting in a few years' time. The two points at which we need administrative assistance are in providing transportation and a more flexible school program for greater student participation.

As for teacher supervision, missionary-spirited pioneers have carried the load to date just because of the fun there is in bringing the enjoyment of the out-of-doors to young people. Perhaps there always will be enough of these folks to carry on in the years ahead.⁹

Life in the Wild

Most school children learn something about the wildlife of the United States if only from their history books and the study of Indians. Some schools, however, have made it possible for their students to see wildlife in its relationship to human life and to the other factors of the environment. Often the relationships are lost because the study is broken down into separate courses. A Virginia girl studied birds for some months in a conservation unit in eighth-grade science. She felt a real lack, however, for she commented: "Now we've learned all there is about the outside of the birds. I can't wait to study biology and find out what's on the inside." Interest in wildlife has been one of the early forces in conservation, so much so that the word "conservation" too often calls to mind sportsman groups whose interest lies in preserving enough pheasants or quail or rabbits to make hunting worthwhile. This is probably inevitable since many state conservation departments are supported from sale of hunting and fishing licenses.

The Raymond, Washington, High School has used part of a biology course to study the wildlife of that state. Soil, water, and plants are studied so that the ecology of the wildlife community can be understood. The class uses visual materials and field trips to make the study vivid. Conservation

⁹ Written by Verne A. Fuller, Muskegon High School, Muskegon, Michigan. Submitted by W. C. Ryder, consultant, Conservation Education, Michigan State Department of Public Instruction.

specialists talk with the class. The students come to know the various public and private agencies which are working in the field, and what their various functions are. The course outline gives an idea of the content and the methods used.

WILDLIFE CONSERVATION AS TAUGHT IN BIOLOGY CLASSES
RAYMOND HIGH SCHOOL

1946-47

- I. Introduction to Problems
 - A. Sound films, *A Heritage We Guard* and *Realm of the Wild*
 - B. The history of the bison and passenger pigeon
 - C. Discussion of need of conservation as evidenced by A and B
- II. Study of Conservation Agencies
 - A. Services of agency—extent, authority, etc.
 - B. Nearest agency office
- III. Upland Game. (Note: Students select bird of their choice for reports. Study to begin near opening of season.)
 - A. Pictures—male, female, and young
 - B. Description
 1. Field marks
 2. In the air
 3. On the ground
 4. Voice
 - C. Life History
 1. Range—over North America and Washington
 2. Breeding and nesting habits
 3. Food
 4. Chief enemies
 5. Abundance or scarcity
 - D. Interesting activities or habits in the life of the bird
 - E. Regulations governing hunting, propagation, etc.
- IV. Migratory Waterfowl. (Note: Same plan as for upland game. Outline will vary slightly to fit waterfowl.)
- V. Mammals of Washington. (Reports and discussions covering.)
 - A. Game Mammals:
 1. Range
 2. Habitat
 3. Feeding habits

Band of Elk Drinking at a Beaver Pond
in Teton National Forest

U. S. Forest Service



4. Breeding habits: (a) behavior, (b) time of mating, and (c) number of young and time of birth.
5. General habit of adults: (a) antlers, (b) hibernation, (c) travel, and (d) acts demonstrative of intelligence.
6. Hunting regulations

B. Predators. (Note: Student reports on life history.)

C. Fur bearers. (Note: Student reports on life history.)

VI. A Student Constructed "Code of Sportsmanship"

VII. A Student Constructed "Code of Safety"

VIII. Wildlife Scrapbooks. (Note: At students option.)

IX. Fish To Be Studied in the Spring.

Comments: A great deal of discussion resulted from the above study. Many boys that otherwise were silent found a field for expression of ideas. Fifty-five students in Raymond High School are now more conservation minded and appreciative of wildlife of Washington than they were September 1, 1946. Any biology class can adjust their year's course to include the above outlined study. The course will be enriched; the students enlightened.¹⁰

Fruits of the Mine

Probably a number of schools provide information on minerals and their place in the economy. Geography teachers

¹⁰ Adapted from report by Lloyd Flem, principal, Raymond, Washington, High School.

often devote attention to the location of mineral sources and to the industrial products of the various states. Only a small number of the reports of school practices dealing with resources focused their attention on minerals, however. This seems to be typical. Our attention has been drawn more frequently to problems of the renewable and inexhaustible resources, such as land and water, than it has to our exhaustible resources, such as oil and gas. It is the latter, however, which are most critical to continued civilization. They are the ones, it will be remembered, which George Renner feels must be protected in many cases either by regulation or by public ownership.

Social Problems under Consideration

An excellent account of a unit on minerals appeared in *The Changing Curriculum*, prepared by the Joint Committee on Curriculum of the Department of Supervisors and Directors of Instruction and the Society for Curriculum Study. As an illustration of curriculum practices, it presented a unit on "Mines, Minerals, and Mining," undertaken by the sixth grade of the Ohio State University Elementary School. It is repeated here to represent a study of resources that not only related one resource to another, but pushed ahead to the significant social problems clustering around the development and use of the various resources.

"Most of the children in this group had been in the school from two to five years, so they began immediately [after summer vacation] to talk about a 'study.' After several days of discussion they concentrated on seven areas of interests as follows: life under the sea; scientific instruments: how they are made and used; iron and its uses ('I saw the Mesabi Mines this summer'); Europe, especially Italy; manufacturing in our country; minerals ('not just iron'); plays or drama; puppets, marionettes, stage, movie.

"Next they developed the following set of criteria for choosing the unit:

1. It should be interesting enough to work on for a long time
2. It should be harder than last year's, and it should be different from last year's
3. It should be about something we can get many books on
4. It should be about something we can get help from trips, people, letters, movies
5. It should be something for which we can have interesting and worthwhile things to do in work period
6. It should be worthwhile.
 - a. Help us to understand and work with people
 - b. Help us to understand and be able to talk with people
 - c. Help us to know what grown-ups with experience think is important
 - d. Help us if there is something we are not so good in.

"At the same time these children listed studies of former years in order to make sure that the proposed study would be more difficult and would insure new types of experience.

"Discussion under the guidance of the teacher proved that the group had not sufficient information on these several interests to make an intelligent choice. Therefore, they started purposeful research as they attacked the problem of exploring and investigating the possibilities of their several suggestions. As research continued, the scope of the various suggestions changed. For example, mining the scope of the various suggestions changed. For example, mining soon bore the label, 'Mines, Mining, and Minerals,' so that it would incorporate all minerals most important to men, and working and labor conditions and problems. The group had found in their exploratory reading that child labor, the Guffey Coal Bill, and dangers in mining were aspects of the problem. Exciting stories of the discovery of minerals and the dangers in mines also appealed to many children. At the end of three weeks when the group considered themselves sufficiently informed to make an intelligent choice, they selected 'Mines, Mining, and Minerals.'

"The plans were then sent to the faculty staff. The teacher was asked to point out to the staff how the proposed study met the criteria set up by the group and to explain that such a study would probably take the entire year, but that the class thought it would be worth that amount of time.

"The staff members felt that this group had thought thru their problem and had met criteria to such an extent that they concurred in the choice of the children.

"The unit thus approved, the group immediately listed these minerals as a beginning: iron, coal, petroleum, marble, limestone, tin, copper, gold, silver. Later they made many additions to this list. They agreed to start with a study of coal and listed eighteen questions as a point of departure. Here are several typical questions: 'When, where, how, by whom was coal found?' 'Is coal a metal?' 'How are metals distinguished from other minerals?' 'How do scientists locate coal and tell where resources are?' 'What are miners' wages? Their expenses?' 'What are the dangers in coal mines?' 'What laws govern coal mining and coal miners' hours and working conditions?'

"As the children read more widely and had other experiences, many more questions arose. Likewise, as the work progressed, the children realized the desirability of reorganizing their questions.

"The group started a mineral collection and found they needed exhibit shelves. Two boys became responsible for planning and making the shelves. Soon every one, either individually or as a member of a small group, had decided upon some undertaking which would contribute to the development of the large unit. These individual and small group plans were approved by the entire class before they were undertaken.

"As research and discussion continued, other construction activities were undertaken. These included the making of booklets, on 'Child Labor,' 'Our Mineral Friends,' and other topics; sets of oil paintings showing various aspects of the study; puppets and an original play to show the story of a coal miner's life; large maps showing the location of metallic minerals, of non-metallic minerals, and of the chief industrial cities in our own country which grew up as a result of mining, refining, or manufacturing.

"As they went about finding, interpreting, and organizing their information and executing their plans, many subjectmatter areas become necessary as integral factors in the daily experiences.

"A few illustrations of the many needs which called for the utilization of various areas of learning experience will suffice to show how subjectmatter areas become integral parts of the learning experience. The children consulted numerous books besides many periodicals, newspapers, and advertising literature. They wrote eighty-seven letters for material and information, many notes of appreciation to those who had helped them, accounts of various helpful trips, experiments, and movies. The study also stimulated the writing of poems and stories.

"The arts were indispensable to the building of exhibit shelves, the making of maps, friezes, oil paintings, and booklets. Science experiments such as plating copper; finding out what rust is; testing to find out whether they had aluminum, lead, or tin foil; and changing coal tar to a dye base helped to clarify their concepts.

"The function of the spécial teacher in this situation needs a word of explanation here. When the arts or science became indispensable either in working out group plans or in the experimental solution of problems, the specialist joins the group and guides such work.

"Health and hygiene became significant when the children found that minerals existed in foods and were necessary to the body. The real values of sunshine and fresh air took on new meaning when they had investigated the effects of mine gases; the dangers of working in damp, dark, dusty coal mines, with dusty lime crushers, or in the great heat of steel mills.

"There was a constant need for mathematical computation as children needed to interpret quantities produced, consumed, or wasted, and to find out whether the minerals were measured by the ton, the barrel, or by the fractional parts of an ounce, as radium is measured; to interpret graphs and tables; to read temperatures. There was constant need for many kinds of computation as the children carried out their various undertakings. Likewise only thru mathematical computation could they understand how recently in the world's history many minerals had become important, and data thus arrived at in turn helped the children to realize how rapid is our consumption and the real need for conservation. In much the same way such important concepts were developed as those of quantity, quality, monetary and utilitarian values, and the effect of supply and demand upon prices.

"As the children made maps on which they located areas where the minerals had been discovered, where they are mined, where untouched resources exist, where and why industries have grown up, they were learning more than place geography; they were realizing the interdependence of different working groups and of different nations. The children were equally interested to learn that often conquest, exploration, settlement, and territorial expansion were brought about because of some mineral resources.

"As they investigated incomes, expenses, living conditions of miners and mill and factory workers and compared them with incomes of persons whom they knew, they became interested in work-



The Orderly Beauty of Natural and Balanced Landscape

Tennessee Valley Authority



them with picnic leftovers. We litter public campgrounds, tourist courts, and public bathing beaches. We have even made an onslaught on our beautiful national parks.

"Our engineers build fine, new highways, and then we let a few opportunities move in and create roadside eyecores consisting of garish filling stations, billboards, unsightly garages, flimsy shacks, 'hotdog' stands, auto wrecking yards, used-car lots, and tourist cabins.

"What can we do about it? In 1935 the Supreme Court of Massachusetts decided that a highway is built, and that therefore the present value of such a location belongs to those who have built and used that highway. This decision confirmed the right of society to regulate and even exclude nuisances from the roadside. Legally, therefore, we do not have to endure these things if we do not wish to.

men's compensation, social-security measures, unemployment insurance, and other current social issues.

"Finally, as a culmination of this study, the group planned to share their information with others. First, they worked out a series of dramatic sketches for what they called a 'News of the Century' program using the school radio for the voice of the commentator. This was followed by an exhibit."¹¹

The significance of this study to children living in an industrial world is very great. The careful planning, in which the children participated, the steady progress of the study into broader fields of human interest, the use of "various areas of learning experience," all give valuable suggestions for study of resources.

The Preservation of Beauty

None of the examples submitted described school activities to increase understanding of the economic value of scenic resources of the United States. Perhaps teachers have not considered scenic beauty as a resource, in spite of its growing economic value. A great number of schools have conducted in making the school ground more attractive carry over to the homes and the community of the children. These efforts are well known, and it is hardly necessary to provide illustrations. The need for attention is clear, however. Renner and Hartley have this to say:

"We Americans seem bent on continually adding more ugliness to the ugliness we have already created. We set fire to brush and grassland, and burn over nearly all vacant lots, groves, and marshes each year. We dump old cans, wrecked autos, and other rubbish in gullies, in ditches, along roadsides, by bridges, in creeks and ponds, and on vacant lots. We camp along streams and roads, leaving disorderly messes of bottles, papers, pie plates, cans, and straw. We invade the farmer's private groves and pastures, and impudently litter

"Five billion dollars, it is estimated, is spent each year on tourist travel. Tourism is becoming our greatest industry. When people go traveling, they naturally wish to go by way of the most attractive route, to halt and spend their money at the cleanest and neatest places, and to visit the most beautiful recreation areas. Disfigured highways and unsightly communities are avoided if possible. Scenery and community beauty thus have a direct cash value, and to neglect or destroy them is unprofitable. The loveliness of a blossom-fringed country road is a natural resource not uncommon in the United States.

"A large part of the trouble is lack of education, and in some instances the wrong kind of education. The art work in public schools, for example, is based on the assumption that the school's task is to train artists, tho only a few children have enough artistic talent to profit by such training. Every child, however, can be taught at least to understand and recognize beauty, and how to create it in a way that will be satisfying to him as an individual in a workaday society.

"One of the first lessons the school child can learn is civic pride—pride in his city, village, or countryside. After this lesson is learned, the normal child can easily be shown how to develop talents in creating beautiful things for himself, his home, and his community. When he becomes an adult he will see to it that some of his community's efforts are directed toward creating the kind of locality which will excite civic pride. The development of the esthetic sense in our people has been too long neglected."¹²

Society Must Protect Itself

To some degree, preservation of beauty and wise use of all resources may require that society exercise its rights thru planning and possibly control restraining individualistic and selfish use of the environment. Schools are responding to this conclusion by studying the various phases of community life and emphasizing needs for group action which gathers up the individual impulses voluntarily into plans which more nearly satisfy needs of the group as a whole.¹³ Undoubtedly,

¹² George T. Renner and W. H. Hartley. *Conservation and Citizenship*. Boston: D. A. Heath and Company, 1940. p. 301-305.

¹³ See, *Group Planning in Education*, 1945 Yearbook. Department of Supervision and Curriculum Development, particularly "Education for Social Intelligence," by Howard A. Lane, p. 2-11.

such progress will at times inject the school program into controversial subjects, since it will find that it must deal with how society is organized and controlled. "Certainly," as Charles Judd said, "there is no justification for evading controversial issues when they arise: Not only is objective, scientific treatment of disagreements possible, but it is the safest preparation of young people for life in the community. If there can ever be cultivated in American society a willingness to deal with social issues on the basis of rational understanding rather than emotional excitement, the highest purpose of education will have been served."¹⁴

We Can Change Our Culture

As the influence of the school has been extended until it reaches virtually all American youth, the school has expanded from an almost exclusive concern with the culture of the past to an increasing concern with shaping and modifying that culture to satisfy needs of society's members more effectively. Community study and exploration have real meaning as the school begins to participate actively in the moving community life, becoming itself an agency of social change. The new curriculum then comes to have an immediate effect on the way people live, and think, and act, in other words, on the kind of culture they create and maintain. The 1944 year-book of the Department of Supervision and Curriculum Development, *Toward a New Curriculum*, stated this clearly in defining the task of the future:

"It seems clear that a restricted concept of what education is and how its functions are to be served will not suffice as schools move toward a new curriculum. . . . Curriculum policies and plans growing out of such a concept will be formulated with reference to the needs and problems of society and of individuals. The curriculum will be

¹⁴ Charles H. Judd. *Education and Social Progress*. New York: Harcourt, Brace and Company, 1934. p. 228.

focused upon the culture—its values, its conflicts, and its potentialities. The competencies required of the individual as a personality and as a member of social groups will be developed. As educational opportunities are extended, education will make a difference in the realities of everyday community living.”

A Community and Its Children Learn Together

Many schools have affected the culture of their communities by redirecting established ways of using resources. An illustration from a one-room school in Breathitt County, Kentucky, will be ample. It was written by the teacher, Bertha Watts.

“Many a one-room school is a drab place to which children grudgingly come for a smattering of the three R’s. It need not be. It can join hands with the home in helping the whole child grow in skills and knowledge, in understanding, and in aspiration. It can join hands with the community so that the entire environment becomes a laboratory for exploring young minds, and the school a contributor to community betterment.

“Our school is an isolated one-room school in beautiful hill country. We wanted it to be as homelike and beautiful as possible. Our older girls from the intermediate grades made colorful drapes as a home project and arranged them so as to shut out no light. Homes in the community contributed a mirror, a dressing table, a few pictures, and flowers in season.

“Pupil committees saw that the room was kept in order and floors cleaned, that water was kept in the cooler, that both toilets were kept clean, and that the playground was free from rubbish. The committee on flowers arranged the cut flowers and took care of the growing ones which were sent from the homes in our community. Every child in school served on some committee every day.

“We studied our community to learn its resources, industries, means of transportation, medical facilities, and kinds of recreation. We learned what we could about the size and furnishings of homes, the education and occupation of parents, the number of children in families, and other factors. Children were observed closely to note health, nutrition, social and emotional adjustment, and interests.

“Many things started in the classroom or on the school grounds

spread to homes and beyond. Our school grounds provided good object lessons in erosion, beautification, and sanitation. We filled the gullies, set out trees and shrubbery, and screened the toilets. The lessons learned were carried home. Since there was much coal mined and sold in the community, we took as many arithmetic class periods as were necessary in teaching the upper grades how to gauge a sled or wagon for coal. They learned how to measure acres of ground, to find out how much corn is in the crib, or to estimate the number of bushels of shelled corn grown on the farm while it is in the ear.

"The farm was one of our projects in social studies. Children learned what to cultivate, what to pasture, what to leave in woodland, and reasons for these decisions. Parents learned from their children the value of cover crops, how to care for pastures, methods of preventing erosion, and numerous other things. Children learned the best breeds of chickens for eggs, for meat, and both. They looked into the question of the types of hogs best suited for various purposes.

"The garden project helped the school-lunch program. In time it affected the standards of gardening in the community and led to more careful selection of garden sites and better practices in harvesting and storing produce. The pupils learned more by practice than from books. They learned the enemies and friends of the garden, how to control certain pests, and why different vegetables required different types of soil.

"In forming health habits, the parents again assisted. One of the outstanding aids in maintaining good health was the hot lunch program. The parents donated lumber and labor and screened off a kitchen in the corner of the room. Each child brought a can of fruit or vegetables to supplement the food purchased for lunches. A well-balanced diet with the necessary vitamins was prepared each day.

"Our community is a large one, and many pupils came walking for two miles, over hills, thru narrow paths, and across creeks, which at times were swollen. To lesson the fear of the parents for the little ones, we had guardians for each group of children. Here again the teacher knew her children. She knew from which direction they came and other factors before she selected guardians for protection to and from school. Pupils enjoyed responsibility and here again the parents cooperated by having little Susie and Billy ready the following morning. These guardians were commended for their services and were changed often to give others a chance to serve the school and community.



"Our collection of books and magazines were made available to the entire community. What we had was for the child in the home as well as in the school.

"Our children were grouped not in grades but according to their abilities. We found out where each child was, put him in the group in which he belonged, and carried him as far as we could during the term, changing him from group to group as he progressed. In spelling, language, and writing we tried to teach the pupils correct expression of oral language and to spell and write correctly all words which they were apt to meet now or later. We dwelt on correct forms of different kinds of letters, simple paragraphs, and the sequence of stories. In reading, we tried to teach the child how to read, lead him to like to read, and to broaden his reading interests.

"Happy is the teacher who has this kind of working relationship with home and community in the exciting business of child development."¹⁵

It Happens in Many Spots

Miss Watts' School may be isolated in space but it is not isolated in program. The work of her school is part of the larger program of the county and state. Mrs. Naomi C. Wilhoit, of the Kentucky State Department of Education, tells how the teachers of Breathitt County brought to their pre-school planning conference all the county agencies to give the teachers reports on the health, agriculture, forestry of the county. The teachers used this information as the basis of plans to make their communities more conscious of their needs. They also planned how to use experiences in the school curriculum which would direct the students toward wise use of resources. This was approached in part thru efforts to improve health. Children's diets were especially poor, and the children with the teachers planned lunch programs to supplement the meager home supplies. They planted gardens to learn how to raise needed foods. They planted trees to save

¹⁵ Bertha Watts. "Happy Is the Teacher." *Virginia Journal of Education*. February 1947. The article was distributed by the Rural Editorial Service, Chicago, Illinois, and appeared in a number of state education journals.

gullies from further washing. Students and their parents learned how to preserve food. Older children and parents worked on sewing and clothes design. School and community joined to plan and develop recreation programs. In one year's time, the personal appearance and personalities of people in the communities were changing. The shy, undernourished, poorly groomed mountain people were enjoying better living because of the school's program in that county. Miss Watts' School was one result.¹⁶ Thru many efforts such as these, schools of America are reshaping its culture into more effective means of satisfying human needs.

Man—the Key to Action

Study of natural resources by themselves, without study of how society has organized itself to obtain use of the resources, cannot be wholly fruitful. As Zimmerman pointed out, the presence of man is what makes a resource a resource. Knowledge of resources is vital because that knowledge is a prerequisite to better use of resources for wider benefit for longer periods of time.

But the word "better" immediately brings the student face to face with the understanding that facts alone are not sufficient. As a member of a community and nation, he must make judgments of how resources are used and who is to benefit in what way from their use. Governors of the states in the White House Conference of Theodore Roosevelt ended their resolutions with the statement that "monopoly [of resources] should not be tolerated." They recognized that the benefits of using resources were guided by the social values which govern use. To them, monopoly meant that resources would be used to enrich the few at the expense of the many, and they registered their opposition to that kind of social value. A study of resources cannot be complete until

¹⁶ From report by Mrs. Naomi C. Wilhoit, Kentucky State Department of Education.

it includes a study of the ways in which the resources are used and how that use is controlled.

Some of the illustrations already given have pointed in that direction. The Ohio State Demonstration School study of "Mines, Minerals, and Mining," reached into the problems of working conditions and compensation for the miners of the coal. It did not, apparently, consider the social organization which permitted working conditions so disagreeable and dangerous that we are still paying penalties in labor unrest and management disorganization. Few, if any, of the other illustrations would support a belief that schools recognize that many of the resource problems with which they are now attempting to deal result from unchecked and uninhibited use of the resources of America for wholly private ends. To do so would require that use of resources be adopted as one major theme in organization of the curriculum. Ohio State Demonstration School found that its study, limited as it had to be, covered a year's time.

Perhaps, then, no satisfactory accounts can be given of a school program which considers carefully all the resources of the nation and region, and then follows their production and use thru the maze of interrelationships of the natural environment on thru the more complicated and delicately balanced interdependence of modern society, finally emerging with a critical evaluation of society's organization and its effectiveness in supplying the wants and needs of present and future generations on the widest possible basis. There are many balances and much lack of balance that such an educational program would have to explore—within the natural environment itself; between individual freedom and community benefit; between personal initiative and social control; between present needs and future needs; between regions and nation; between nation and world; between planning and *laissez faire*. For the search is for a balance that will permit

us to have both parts of sets of values which at times must appear antithetical.

Luckily, we are finding technics by which the choice can be avoided and the conflict minimized. We can use land and have it, if we follow known principles of land-use, and if the social organization under which we operate makes possible the kind of agriculture which establishes a new balance to replace the natural balance. We can have planning, so that the best use of our resources for society's benefit can be obtained, and we can have freedom also, if the planning is democratic, reaching its conclusions on the weight of objective evidence and wide consensus. A satisfactory statement of education's responsibility in creating general understanding of resources is in Mr. Olsen's article, noted earlier.¹⁷ His conclusion is:

"School study of America's resources in their functional flow makes imperative an integrated science-social studies curriculum sequence. Science deals largely with material things; social studies with people, institutions, and ideas. When the study of resources is approached thru science courses, therefore, primary concern is given to earth resources and perhaps to technology. And when resources are analyzed in social studies courses, most emphasis naturally falls upon institutions, aspirations, and people. Yet, as we have just seen, the whole meaning of the American problem will be missed unless all resources are studied, and then not only as separate areas but also in their functional interflow. That is why the integrated approaches of both science and social studies are essential to the development of social perspective in children and adults alike."

Zimmerman had earlier stated the desired result when he said:

"In my opinion, the greatest need today is for leaders endowed with a highly developed social consciousness and a broad outlook,

¹⁷ Edward G. Olsen. "Educating for Social Perspective." *NEA Journal* Vol. 31, No. 9, December 1942. p. 278-79.

insure continuing improvement in living for all the people, and (b) that the school as a specialized educational institution is a functioning, integrated part of a dynamic community life.

The school is one agency which helps to provide better living for all and which has especial responsibility for the education of people. Hence, the purposes of a community school are (a) to enrich and make realistic the education of children, youth, and adults, and (b) to improve community living.

The program and services of a community school reflect and deal with the problems and resources of its community, and with the intelligent uses of all resources. The method of the community school is based upon cooperation. The school, therefore, (a) secures the services of other agencies, (b) makes full use of community resources, (c) assists other agencies with their programs for community betterment, and (d) promotes the development of community leadership.

Types of Resources

Resources are found and developed in (a) the natural environment, (b) the biological, psychological, and spiritual potentialities of human beings, and (c) the social environment. These are three arbitrary divisions of the unified environment of which man is a part. The divisions are made for practical purposes. They are:

1. *The natural environment.* The inorganic and the organic substances and forces (besides man) of the environment, in all their interrelationships and patterns of existence. These are the natural resources upon which man depends for sustenance. They include: air, water, sunshine, soil, minerals, plant life, and animal life.

2. *The biological, psychological, and spiritual potentialities of human beings.* These potentialities are: man's biological energy, his capacity to do work and effect changes in his environment, as reflected in his state of health and physical activity; man's psychologi-

cal energy, his capacity to solve problems intelligently, as reflected in stability and integration of personality and in creative living; man's spiritual energy, his capacity for moral and esthetic aspirations and achievements, as reflected in the continuing struggle for better living for all men.

3. *The social environment.* The processes and structures of group relationships for satisfying human wants, as reflected in social and economic institutions, organizations, social classes, language, customs, and technology.

Use of Resources

The intelligent use of resources in any situation may involve:

1. Utilizing fully and appropriately resources which are available
2. Making new resources available thru development and conservation
3. Adjusting utilization of available resources to their capacity to sustain continuing use.

Areas Considered

To reduce the project to manageable proportions the area of resource-use under consideration must be limited. Three areas have been defined, with this need for limitation in mind. They are educational concepts, programs, and methods which are directed toward:

1. Raising the income base
2. Improving patterns of using food, clothing, and shelter
3. Improving community life by raising the level of individual and group participation in community activities.

Each of these three is considered an area of adjustment—mutual adjustment of individual and group wants and the natural, human, and social potentialities of the environment. The quality of education in each of these areas is to be judged by its success in providing the information, understanding, skills, and attitudes necessary to satisfactory adjustments in the community, state, region, nation, and world.

Subdivisions of Areas

To indicate more clearly the concern of the project, the three areas are subdivided as follows:

1. *Raising the income base*
 - a. Improving the productivity of industry
 - b. Increasing the markets of industrial products
 - c. Adjusting the pattern of industry to the availability and status of resources
 - d. Developing new industries to utilize resources
 - e. Improving the productivity of agriculture
 - f. Increasing the variety of agricultural products
 - g. Increasing the markets for agricultural products
 - h. Adjusting the pattern of agriculture to the availability and status of facilities
 - i. Developing new patterns of agriculture to utilize resources
 - j. Increasing the availability of transportation, communication, and service facilities
 - k. Improving transportation, communication, and service facilities
 - l. Relating the pattern of transportation, communication, and service facilities to the occurrence and use of resources
 - m. Increasing individual skills and abilities for increased productivity and efficiency in agriculture, industry, transportation, communication, and services
 - n. Increasing wage and salary levels
 - o. Increasing security against sickness, disability, and old age
 - p. Increasing the purchasing power of wages and salaries.
2. *Improving patterns of using food, clothing, and shelter*
 - a. Improving diet habits on the basis of scientific nutritional standards
 - b. Increasing the variety of foods available for a proper diet especially, at lower price levels
 - c. Increasing the nutritional quality of foods available, especially at lower price levels
 - d. Improving patterns of land, water, and forest management to raise the nutritional quality of foods
 - e. Increasing skills and improving habits in home preservation of foods, from the standpoints of variety and of nutritional qualities

- f. Increasing and improving community facilities for scientific food preservation
 - g. Improving clothing habits on the basis of accepted standards of protection, comfort, and style
 - h. Increasing the variety of clothing available, especially at lower price levels
 - i. Improving the quality of clothing available, especially at lower price levels
 - j. Improving the utilization of resources to provide raw materials for clothing
 - k. Improving skills and habits in making and adapting clothing
 - l. Improving the quality and efficiency of manufacture processing of raw materials into clothing
 - m. Improving housing according to accepted standards of adequacy, durability, function, and style, especially at low price levels
 - n. Increasing the availability of adequate housing, especially at low price levels
 - o. Improving processing and the utilization of raw materials for housing
 - p. Maintaining and improving the amount and quality of resources for housing
 - q. Improving skills in building, adapting, and improving housing.
3. *Improving community life by raising the level of individual and group participation in community activities*
- a. Increasing individual participation in group and community activities
 - b. Increasing group participation in programs of common interest to the whole community
 - c. Increasing harmony and cooperation among groups
 - d. Increasing citizen knowledge of and use of community agencies and institutions
 - e. Improving the use of county, state, regional, and federal agencies by the community
 - f. Developing in individuals skills in cooperative group and community activities
 - g. Developing in groups more effective methods of organization and action
 - h. Developing more effective coordination and planning for the total community

- i. Increasing the individual's sense of belonging, participation, and pride in his community.

Suggested Outcomes for School Programs

The school program designed to improve living for pupils and community develops philosophy, methods, and materials to achieve understanding and competence in the fields above. This effort is not at the expense of other major educational objectives—such as the development of basic skills, expression thru the creative arts, and others—but is integrated with them in a unified school program. It is the task of the cooperative program to define the specific outcomes desired of the school program in the three areas delimited. Some of the results of this effort may look like the following.

1. Basic information

- a. The major industrial and agricultural resources of the community and their pattern of occurrence
- b. The major patterns of industry and agriculture—kinds, location, materials used, major processes
- c. The extent to which resources are being used by agriculture and industry
- d. The extent to which resources are not being used or are being wasted by industry and agriculture
- e. The major markets for industrial and agricultural products
- f. The major problems in industrial and agricultural production
- g. The major resources for food production, housing, and clothing—their pattern of occurrence and their status
- h. The major patterns of processing food, clothing, and housing
- i. The major habits of diet, housing, and clothing
- j. The major occupations and their distribution
- k. Salary and wage levels and their distribution
- l. The current purchasing power of salaries and wages
- m. The social organizations and institutions working in the community and their purposes and methods of working.

2. Basic understandings

- a. That income levels depend upon the number and kind of jobs available

- b. That the number and kind of jobs available depend upon the way and extent to which industrial and agricultural resources are being used, the markets available and how they are being used, and the way income is being distributed
 - c. That occupational skills and individual efficiency condition both the income of the individual and the possibilities of using industrial and agricultural resources fully
 - d. That food, clothing, and shelter affect the health and efficiency of individuals and of agriculture and industry
 - e. That the kinds of resources available and the way they are being used affect food, clothing, and shelter
 - f. That good health depends on good diet which depends on good soils
 - g. That careful planning and use of available resources can improve food, clothing, and shelter
 - h. That diet can be much improved by home growing and preservation of foods
 - i. That the improvement of incomes, food, clothing, and shelter is partly a problem of national and world policies, but that the people of the community can do much to make their own lives better
 - j. That improving incomes, food, clothing, and shelter in the community requires individual and group participation in community activities, and cooperation among groups
 - k. That the community is a better place to live if people participate fully in its activities
3. *Basic skills*
- a. Ability to find and interpret data about industry, agriculture, natural resources, wages, occupations, food consumption, housing and clothing conditions, community organizations, and participation in community life
 - b. Ability to present such information in written, graphic, and oral form
 - c. Ability to recognize and interpret signs of deterioration and maladjustment in income, food, clothing, shelter, and community life—unemployment, malnutrition, and intergroup conflict
 - d. Ability to apply scientific generalizations to new facts and situations about income, food, clothing, shelter, and community life

- e. Ability to perform some simple technics, such as gardening, cooking, preserving foods, repairing furniture or clothing
 - f. Ability to recognize the implications of public policy for income, food, clothing, shelter, and community life
 - g. Ability to participate effectively in cooperative group activities
 - h. Ability to use the common machinery of democratic decision-making and government.
4. *Basic attitudes*
- a. The natural resources of the community are the foundation of income, food, clothing, and shelter both for present and future generations; they should be used wisely.
 - b. These resources are a heritage of all the people, not of a few. They should not be used to enrich a few people at the expense of others or to the detriment of the resources themselves.
 - c. Those who control the exploitation of these resources should regard them as a public trust.
 - d. The health and happiness of the people of the community depend partly on their level of income; their use of food, clothing, and shelter; and their participation in community life.
 - e. The people must have health, energy, and skills to be able to improve their lives.
 - f. Scientific principles and methods should be followed in improving income, food, clothing, shelter, and community life.
 - g. Social organizations and institutions, including government, are tools for the community to use in making these improvements.
 - h. The people of the community have freedom to make choices about income, food, clothing, shelter, and community life. In return for freedom to choose, they have the responsibility of choosing wisely.
 - i. Each individual has responsibility for using resources wisely and for participating in the life of the community. He should do his part to improve income, food, clothing, shelter, and community life.

Characteristics of Suggested School Program

If these are some of the outcomes desired from a school program, we can suggest some of the practices or character-

istics of a program seeking to achieve them. The school:

1. Provides experiences which enable pupils to learn the information, understanding, skills, and attitudes necessary to wise resource-use
2. Provides experiences which enable pupils to develop skills, understandings, and attitudes necessary for constructive participation in cooperation, group and community activities, and democratic government
3. Provides experiences which enable the student to master the fundamentals of a scientific approach to the solution of personal and community problems
4. Thinks thru its philosophy of education and the outcomes it desires to achieve, and bases its practices and activities thereon
5. Utilizes whatever available methods and materials that prove best for the purposes desired
6. Guides the growth of activities out of the interests of pupils, rather than superimposing them on pupils
7. Maintains a spirit and practice of continuous self-evaluation and improvement
8. Uses democratic planning in evolving the program of the school including participation of administrators, teachers, pupils, parents, and the community
9. Participates actively in the life of the community, providing (a) educative experiences for the young people, and (b) leadership in the community
10. Utilizes other community agencies, leaders, and resources to improve instruction
11. Enables and encourages teachers to be part of the economic, social, and cultural life of the community
12. Makes the school grounds a demonstration of wise resource-use
13. Provides a clean, healthy, wholesome environment for child and adult activities
14. Makes the school plant available for adult education, recreation, cultural life, and other community activities
15. Makes its equipment and teaching skills available to provide training and educative experiences for adults
16. Furnishes personal guidance to young people to help them make personal, vocational, and social adjustment—both while they

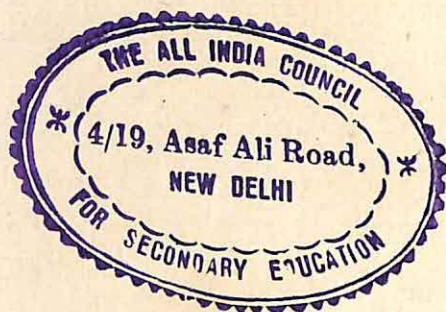
are students and between the time they leave school and the time they achieve adjustment into adult life

17. Seeks opportunities for and guides educative-work experience for young people

18. Keeps informed of community needs, problems, and opportunities

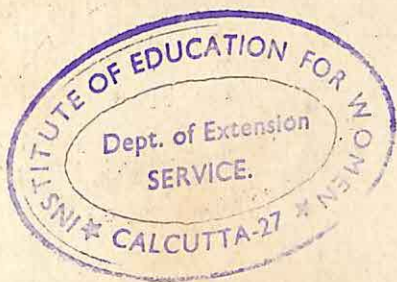
19. Provides opportunities for inservice training and professional growth for teachers, and encourages and enables them to take advantage of other opportunities of this kind.

This project is illustrative only. The significance of the framework under which it is to be conducted is great, however, since it suggests the wide scope that school programs concerned with comprehensive study of resources must adopt. If we study what we have, what we know, and what we want, we study the total relationship between man and his resources. We can then reach a school program which points toward better life for all.



It is time that we face about and reorient education toward the process of engineering a permanent and enduring society. Foremost among the problems requiring immediate attention and frontal attack is the waste of our natural resources—our physical and biotic wealth.

—GEORGE T. RENNER





How May We Move Ahead?

EDUCATION on resources is neither fad nor frill. It is rather a prime social imperative becoming more obvious with every passing year. If we Americans continue to squander natural resources at present rates, our economic and ultimate social decline as a nation appears certain. Our common human welfare now demands immediate, practical, and sustained school instruction in this social problem area.

Yet it is also clear that:

"Conservation must exist in the mind before it exists on the land. The number one problem in the establishment of conservation lies before the educators of the nation. The causes of destruction and depletion are deeply fixed in the American way of life, in the habits, attitudes, and institutions which comprise our culture. The problem cannot be legislated out of existence unless and until conservation is supported by popular ideas, attitudes, and beliefs. Thus the superintendent of schools is the key leader in educating the apathetic citizen. Our schools should make the citizen aware of the resources upon which he depends for survival, the role they play in the rise and decline of civilizations, and how they are to be regarded as to their abundance and exhaustibility. Translating conservation into school terms, the ultimate issue is hunger, squalor, poverty, ignorance, destruction of physical and social vitality, depopulation, and finally disappearance of the civilization. Every teacher, in every grade, in every subject, must share this responsibility of teaching conservation, the primary duty of our schools. Conservation being a matter for education, the schools must accept the major responsibility of relating it to ordinary life."¹

¹ Ollie E. Fink. *The Gateway to Conservation*. Friends of the Land, 1638 North High Street, Columbus, Ohio. p. 9-10. (Mimeo.)

This statement well expresses the sound and historic conviction that the educational process, and more particularly the school, does provide an essential method of arriving at better practices in using our environment. Theodore Roosevelt, it will be remembered, called in educators along with scientists and political figures when he held his White House Conference on Conservation in 1908. Van Hise followed that conference with a college text on conservation. Perhaps more significantly, a number of states in the years that followed adopted legislation requiring instruction in the conservation of natural resources in the public schools. However much we may deplore this compulsive method of curriculum construction, it does illustrate the growing public concern that the schools carry out their implied obligation to aid wise use of resources.

Curriculum by Law

Since 1929, at least eight states—Arkansas, Florida, Georgia, Kentucky, Maryland, North Dakota, Oklahoma, and Wisconsin—have added legislation requiring school instruction in natural resources. Conservation has thus moved from a concern of colleges and universities alone to that of the entire public-school system. The Kentucky law of 1944 is a good example of this kind of legislative requirement. It is entitled “An Act Relating to the Teaching of the Conservation and Preservation of Natural Resources in the Public Schools of Kentucky,” and reads in part:

“Whereas, the natural resources of this state—forests, soil, water, minerals, and wildlife—have been exploited and destroyed so that coming generations will be deprived of their privilege of economic welfare, therefore,

“Be it enacted by the General Assembly of the Commonwealth of Kentucky:

“Instruction in all phases of conservation and preservation shall

be included in the curriculum of the public schools of Kentucky, and textbooks regarding the proper use and production of forests, soil, water, minerals, and wildlife shall be prepared or selected by the State Textbook Commission for this purpose."²

This Act, like similar ones in other states, places direct responsibility on the schools to modify harmful practices in use of resources. It also directs the state school officials to make sure that adequate instructional materials are provided for this purpose, even to the extent of preparing them as needed.

Leadership at a National Level

The Franklin Roosevelt program of resource development, as well as the dramatic warnings of dust storms and floods during the 1930's, hastened efforts of schools to undertake instruction in wise use of resources. In 1937 the U. S. Office of Education called the first national conference on conservation education. This was attended by representatives of federal agencies in Washington, state education executives, specialists in education and conservation from universities and colleges, and officers of lay organizations working in the interests of conservation. These experts recommended that the Office of Education enlarge its program at the earliest possible moment "to serve the growing needs of schools in the United States in the field of conservation education."³

The Office of Education followed that conference with the issuance of an excellent bulletin, *Conservation in the Education Program*. This publication outlined a framework for teaching resource-use, identified school programs of merit in several states, and provided a helpful bibliography for teacher use. It concluded that "the importance of conservation education to our social, economic, and political life is such that it should be made an integral part of the program of instruc-

² Kentucky Acts of 1944. House Bill 313.

³ Reported in, *School and Society* Vol. 46, No. 1180, August 7, 1937, p. 172-73.

tion."⁴ It suggested also that seven guiding principles be followed when introducing the study of resources and their use into the school program. These principles were:

1. Conservation cannot be adequately taught thru a single unit or a series of single units in this field. While for purposes of emphasis it may be desirable to develop such units, it is only as the concepts of conservation are made a fundamental part of curriculum planning that the subject can be adequately treated.

2. The materials of conservation education lend themselves effectively to curriculum planning. Conservation forms one of the major themes which may appropriately be considered in curriculum construction.

3. The materials available in the field of conservation from both private and governmental sources provide basic material to be developed and organized for instructional purposes.

4. In developing a program of conservation education it is important to consider the various aspects of conservation, but such consideration should by no means narrow the view of this subject for the pupils. It is important that the whole problem be approached in the large.

5. Conservation education cannot appropriately be confined to any one subject or field. Its understanding and appreciation come best thru a knowledge of materials in several fields including economics, science, civics, agriculture, home economics, and geography.

6. The primary concepts of conservation can be understood and appreciated in their elementary form by very young children.

7. In developing a curriculum in conservation education its larger concepts should be dominant and such aspects as the study of wild flowers, the protection of game, the proper utilization of mineral resources should be presented as elements in the developments of a complete program.⁵

A number of representative practices are recounted in such states as Virginia, New Jersey, Pennsylvania, South Dakota, Michigan, Wisconsin, and California, and efforts to relate teacher-education to conservation are briefly described. In

⁴ W. H. Bristow and Katherine M. Cook, *Conservation in the Education Program*. Bulletin No. 4, Department of Interior, U. S. Office of Education, Federal Security Agency, 1937. p. 8.

⁵ *Ibid.* p. 9.



Soil Conservation Service, U. S. Department of Agriculture

Clay County, Alabama Teachers Study Timber Stand Improvement

another bulletin the following year, the Office of Education supplied useful suggestions for organizing conservation instruction in the elementary school, and suggested a unit on soil conservation with activities suitable for primary, intermediate, and advanced pupils. An excellent bibliography of materials is present.⁶ A special bulletin on conservation excursions, published in 1939, gives detailed information on planning, conducting, and evaluating field trips as part of instruction in the use of resources. Activities are suggested for excursions to study soil, water, flowers, trees and forests, birds, fish, minerals, history, and culture.⁷

Regional Activities Have a Place

These national efforts served to stimulate and guide significant regional interest in the increase of instruction on re-

⁶ Effie G. Bathurst. *Teaching Conservation in Elementary Schools*. U. S. Office of Education, Federal Security Agency, Bulletin No. 14, 1938.

⁷ Effie G. Bathurst. *Conservation Excursions*. U. S. Office of Education, Federal Security Agency, Bulletin No. 13, 1939.

source-use. In 1939, a joint project of the Progressive Education Association and the National Education Association produced a major listing of source materials available to secondary schools and colleges on the use of regional resources, and sponsored the organization of several projects thru which research information on such subjects as nutrition was translated into instructional form.⁸

Furthermore, groups of states began working together to develop activities which would deal effectively with the resources of a region. Spurred by the hydroelectric expansion of the Northwest, a number of agencies formed a Pacific Northwest Regional Council in 1939, with the purpose of providing research results to educators so that the progress of the region could be hastened as information on its problems and opportunities became widely disseminated. The Council prepared a comprehensive bibliography of research materials that dealt with the resources of the region, and published certain units on resources of the Northwest for use in schools.⁹

In 1939, also, several representatives of universities in the South joined with TVA in establishing an Advisory Panel on Regional Materials of Instruction, which set its purpose to encourage and assist in translating the results and benefits of research into educational programs that contribute to the solution of regional and national problems. It guided preparation of materials on malaria control, community planning, and the general principles of resource development. Its actual accomplishments in the preparation of materials were overshadowed, perhaps, by a wider success in stimulating interest of schools and colleges in more effective dealing with problems of resource-use.

⁸ Paul R. Hanna, Harold C. Hand, and others, *Role of Education in Utilizing Regional Resources*. New York: Progressive Education Association, 1939. (Mimeo.—out of print.)

⁹ See, *Men and Resources: A Study of Economic Opportunity in the Pacific Northwest*, 1941; *Pacific Northwest Resources in Outline*, 1940; *Forest Depletion in Outline*, 1940; *Soil Conservation in Outline*, 1940. Portland, Oregon, The Pacific Northwest Regional Council.

To some extent, its efforts led to the formation of the Committee on Southern Regional Studies and Education in 1943. That committee, established by the American Council of Education and supported in part by grants from the General Education Board, has been remarkably effective in leading and merging the various interests of the South in better use of its resources. It has sought to strengthen the services of existing state and regional organizations in research, education, and planning, and has worked with thirty-eight regional organizations and more than six hundred fifty state institutions and organizations. It has prepared regional materials needed for more effective instruction on resources, has aided states in the establishment of administrative organizations which will devote their attention to state problems in education on resources, and has become the clearinghouse for information on developments thruout the South.¹⁰

At present writing, the committee is guiding the preparation of a source book on resources of the South. This volume, written by the staff of the University of North Carolina, will doubtless provoke general interest while having greatest usefulness within the region where the problems it recounts are immediately vital to the people.

States Tackle the Problem

Individual states also have been active in increasing their emphasis on education and resources. Many state departments of education have issued bulletins providing suggestions on the subject, among them being Wisconsin, Michigan, Tennessee, Virginia, Illinois, New York, and California. The Virginia State Board of Education has included a supervisor of conservation studies, who works directly with the schools and

¹⁰ For further information on the work of this significant committee see, John E. Ivey, Jr. *Channeling Research into Education*. Washington, D. C.: American Council on Education Studies, 1944; *Education for Use of Regional Resources*. Washington, D. C.: American Council on Education, 1945; and *High School Journal*, May 1946. The Committee also publishes a periodic newsletter, with brief accounts of educational activity in the South.

teachers of the state in preparing materials on resources and in aiding teachers to develop more effective instruction in the field. Alabama and Texas have supervisors of resource education whose duties are similar. Michigan has a comparable position in its state department of education. North Carolina has established a Commission on Resource-Use Education, composed of representatives of forty-five agencies operating in the state, with an executive secretary who will bring the various agencies into focus on the resources of North Carolina and the contribution which the schools can make to their better use. Florida has established a similar commission, and the four states of Arkansas, Louisiana, Oklahoma, and Texas, have set up an interstate resource-use education committee, which ties together efforts in those states.

Special materials by states are also in preparation. In Louisiana, for example, a materials bureau has been established in Louisiana State University that responds to needs identified by the Louisiana schools for materials dealing with state and local situations. The authors of the books are specialists on the university faculty; the state department of education approves the material for use in the schools. It is then edited by the Educational Materials Bureau so that the language is suitable to the grade level for which it is intended. After the book is tried out in a few schools and revised in line with criticisms by the teachers and their pupils, it is passed upon by the state board, published, and distributed over the state. By this effective route, Louisiana has been supplied with such supplementary materials as *Louisiana's Natural Resources, Their Use and Conservation* by John B. Robson; *The Mississippi River* by Richard Joel Russell; *The Indians of Louisiana* by Fred B. Kniffen; *Trees and Forests of Louisiana* by Alden L. Powell. Other volumes are planned on geology, salt and sulfur, petroleum and natural gas, and old Louisiana trails.¹¹

¹¹ See, *Education in Louisiana* Vol. 5, No. 5, November 1946, p. 6.

Bases for Advance

Encouraging Interaction

These various regional and state activities have been directed toward three general ends. *They have been concerned with developing more direct and immediate contacts and relationships among the educational groups and the research and action groups.* There has been definite need, for example, to bring educational leadership into direct contact with what other public agencies are doing so that the educational program can benefit immediately from the results of research, thus minimizing the lag that lies between proved research and educational programs. By so doing, educational agencies can effectively support the efforts being conducted by other public agencies. If the state health department is concerned with improving the health of the people of the state thru control of various health hazards, the school has a responsibility to become a part of that effort. It cannot remain either unaffected or unconcerned if it is to execute a significant function in community life. Its chance of doing so, however, will depend upon the closeness of its relationship to public and research agencies other than itself.

Preparing Materials for Local Needs

The regions and the states have been actively interested in preparation of materials which will reflect the most recent research and will be pointed directly toward the problems of the areas themselves. These specialized materials supplement the more usual textual material available on a nationwide scale, which, of necessity, cannot deal specifically with the problems and opportunities of each region. It is necessary, therefore, to supplement the nationally produced materials with those of more immediate application. The problems of irrigation are of little concern to states of heavy rainfall, but they

are of controlling concern to the Rio Grande Valley. Regionally and locally produced materials can bring background information out of a broad view into a more specific and therefore more urgent focus.

Providing Learning Experience for Teachers

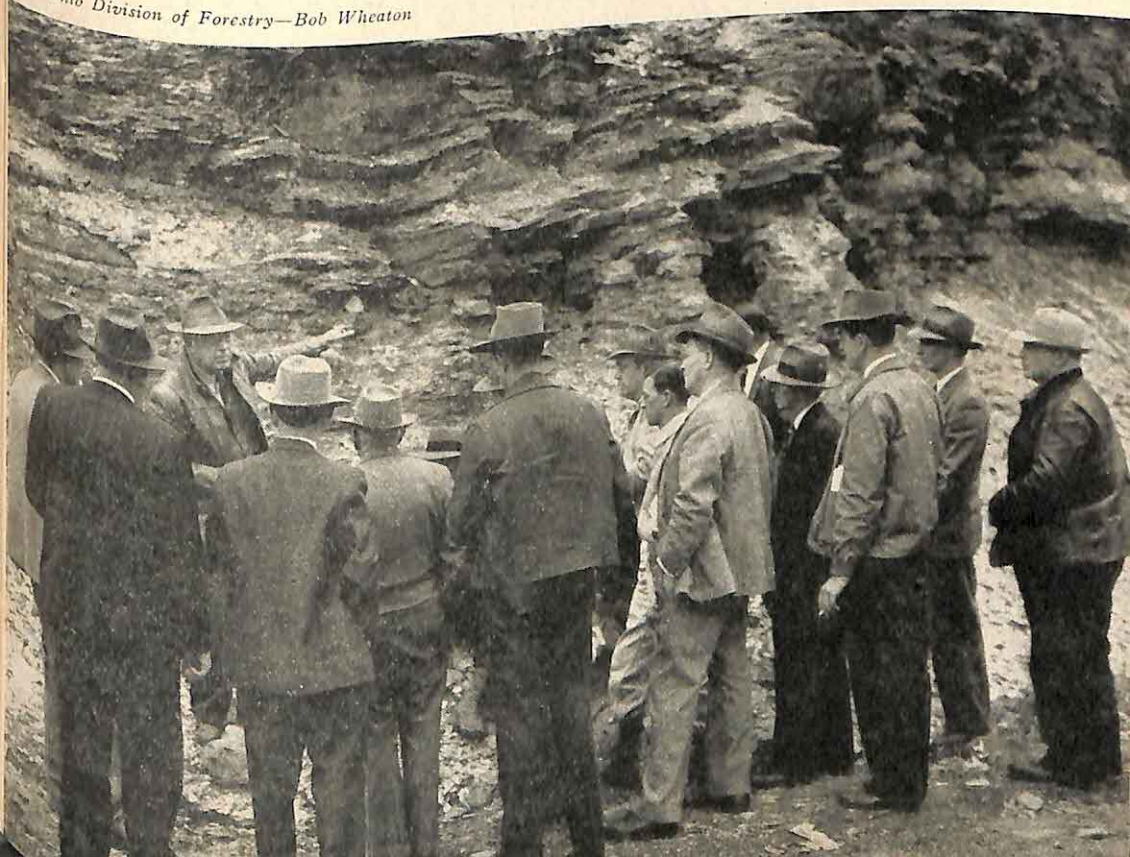
The states and regions have given attention to the education of teachers who will be able to function effectively in this field. Thru a great variety of methods, both preservice and inservice education of teachers are being modified to assure more effective instruction about resources. Naturally the greater amount of this has been in the inservice field, where special summer activities can be undertaken without major reorganization of a college curriculum. In the South, for example, during the three summers 1944-1946, over two hundred separate workshops and study groups have been held to study resources and to identify ways in which the schools can more effectively modify the culture to provide for their better use. Most of these workshops have been held on college campuses, but many have been organized within the communities themselves, sometimes drawing together the major portion of teachers in the county. Typically, the teachers have analyzed the resource bases of the county, studied the principles of the resources they find with the aid of specialists from the various fields of knowledge, and have then prepared plans for use in their schools during the following year. Kentucky has established a program which continues thruout the year; this identifies each teacher-education institution within the state with a neighboring county school system. The institution and the school system work together to find more effective ways of relating the school program to the community life, and in so doing identify the ways in which the resources of the community can be brought to bear more satisfactorily on the level of living in

the community. Thru such joint planning and evaluation, the county and the college both benefit.

The Ohio Program for Improving Conservation Teaching thru Inservice Education illustrates effective cooperative effort. This program, sponsored jointly by the Ohio State Department of Education and the Division of Conservation and Natural Resources, in 1946, enrolled most of the key school administrators in eight selected counties. Four main sessions at two-week intervals were conducted for each county during the fall of the year, with follow-up or continuation sessions later. The administrators studied the physical basis of resources, soil conservation, improvement of land-use practices, forestry and woodlot management, wildlife management problems, school implementation, and the like.

Ohio School Administrators Study Rock Formations Underlying Their County

Ohio Division of Forestry—Bob Wheaton



A total of 389 persons representing conservation-concerned agencies attended these sessions, and over one hundred and fifty people were regular participants. Considering the realities of educational leadership, it is significant that 91 percent of the county school leaders attended sessions, three-fourths of them regularly. A full-time qualified program coordinator planned the courses, conducted the sessions, and evaluated results, among which are projects and plans for countywide teachers meetings, inservice training programs for all teachers, and a general renewal of conservation interest in many individual schools.¹²

During the summer of 1947, the Eastern Washington College of Education at Cheney took still another approach to the study of resources. It offered an integrated Columbia Basin Workshop devoted to systematic study of the total Columbia Basin Project including Grand Coulee Dam as an example of successful government planning. According to their special interests, students studied the project in relation to its historical, geographic, geologic, economic, biologic, sociological, and educational aspects. Consultants included a nationally known geographer and geologist, expert economists and sociologists, construction engineers, hydroelectric engineers, farm planners, land settlement experts, and soil scientists. Field trips, discussions, audio-visual aids, individual experiments and group research projects, and committee reports were among the learning approaches used. Participants developed appropriate learning units for both elementary and junior high-school levels. Academic credits were earned partly in education and partly in history, geography, biology, and other fields as desired by each individual student.

These are but three illustrations of what is being done primarily on the inservice level to help qualify teachers for

¹² See, Carl S. Johnson. "School Men Tackle Conservation." *Ohio Conservation Bulletin* Vol. 2, No. 2. February 1947. p. 14-15, 28.

effective work in instruction on resources. For obvious yet often illegitimate reasons, preservice education has thus far been less affected directly. In at least one state, however, a four-year organized curriculum in conservation is now offered. The Central State Teachers College at Stevens Point, Wisconsin, established in 1946 a conservation major which considers natural resources from various points of view including their economic importance, biological and ecological relationships, and esthetic and recreational values. Enrolled students receive carefully planned instruction in forestry, geology, wildlife management and recreation, social adjustment and planning, soil conservation, public health, economics of land-use, and the like.

Professional programs like this, if sufficiently extended and improved, should eventually produce teachers who can guide that understanding of resources which our nation needs and lacks today.¹³

It is evident that schools and colleges are taking up the challenge issued forty years ago in the White House Conference of 1908. They are accepting their responsibility for dealing wisely with the many knotty problems of wise resource-use and they are organizing their instruction so that they can hope for specific, concrete, and significant results. Only a beginning has been made, but that beginning seems to have vitality enough to promise a strong future. Administrative and supervisory aids are needed; materials are needed; and teacher education is needed. Work is being done on all of these problems, and many of our schools are undertaking extensive programs which will be of considerable significance.

¹³ Teachers may be ahead of college administrators in their concern about resources. One conclusion of a survey conducted by Vernon G. Carter in Zanesville, Ohio, was: "Teachers would teach more conservation if they knew more about it. More than 40 percent of those returning questionnaires would take training, if it were easily available . . ." See his "Conservation Education Gains Favor" in *The Elementary School Journal*, Vol. 46, No. 10, June 1946, p. 561-62.

Teachers Can Take the Lead

In this field as in every other, however, the essential key to continued advance is the teacher himself. Such teacher-education programs as described, whether preservice or in-service, are unfortunately few and scattered. What, then, might be done by the individual teacher who feels concerned about wise resource-use, desires to develop an emphasis on resources in his own instruction, yet must direct his own study? What helps can he find? Where can he secure guides to individual study and action? How might he proceed "on his own" to develop increased competence in education on resources?

There is no easy or single answer to these questions but two suggestions may be offered: (a) use a variety of learning experiences in self-education as in classroom teaching, and (b) seek significant instructional materials and experiences from varied sources. Let us briefly consider each of these.

Use a Variety of Learning Experiences

A number of different ways can be used to learn about resources. Direct, firsthand experience in seeing and solving problems of resource-use is perhaps the most vivid. But that direct experience must be supplemented by other types of experience—documentary materials, audio-visual aids, constructing activities, and community experiences—if learning is to be fully effective.¹⁴ These four types of learning experience include both vicarious and direct approaches. Within each of them several more specific kinds or types of learning experiences are possible: (a) books, magazines, bulletins, pamphlets, newspapers, lectures, discussions, essays, debates, reports; (b) maps, charts, graphs, objects, specimens, models, pictures, slides, filmstrips, motion pictures, recordings, radio

¹⁴ For fuller explanation of these four approaches see, Edward G. Olsen. "Getting the Community into the Curriculum." *Educational Leadership* 4:328-33; February, 1947.

programs; (c) drawing, painting, modeling, mural-making, dramatizing, constructing, displaying; (d) resource visitors, interviews, field trips, surveys, service projects, and work experiences.

No single learning project or unit of work is likely to use all of these experiences. But every good program should include one or more experiences of *each major type*; for example, one should read and talk about the physical, economic, and social aspects of resources and their wise use; should study pictures and charts, see slides, filmstrips, and motion pictures; might draw, paint, or model relevant data; and should surely hear conservation speakers, take field trips to see conservation needs and procedures, and survey local problems and resources. An excellent procedure is to study a particular section of land, mapping its devastated areas, analyzing its reclamation possibilities and appropriate technics, planning ultimate and needed next steps, recommending accordingly, and then actually engaging in conservation efforts as a part of community service.

All four types of experience should be used in balance if effective learning is desired. This is as true for the adult as for the child.

Discover Many Sources

Teachers interested in gaining background information on resources or in developing school units of work can secure a wealth of documentary materials, audio-visual aids, and field experiences in the community. Such educational sources are far more numerous and readily available than many teachers realize. Excellent bibliographies, teaching handbooks, bulletins and guides, pamphlets, sample units of work, books, charts, graphs, flat pictures, colored slides, filmstrips, motion pictures, transcriptions, resource speakers, field trip opportunities and survey, service project and work experience possibilities may be secured from or suggested by the local school

or public library. Many of the following agencies also welcome inquiries and loan materials as well as provide speakers and other specialized leaders:

NATIONAL GOVERNMENT AGENCIES

The federal government thru several of its departments and agencies has issued a number of excellent publications, chiefly inexpensive bulletins. These may be purchased at nominal cost from the Superintendent of Documents, Washington, D. C. That office periodically issues bibliographies of government publications which can be received upon request.

Bureau of Biological Survey, Department of Agriculture, Washington, D. C.

Conserves wildlife; acquires and maintains bird refuges and game preserves; administers wildlife conservation laws; cooperates in development of improved methods of propagation of fur and other animals.

Bureau of Fisheries, Department of Commerce, Washington, D. C.

Develops methods of regulating the fish industry and supply in the interest of conservation; administers Alaska fisheries and fur-seal industries, and care of the Pribilof Island natives; administers laws for the protection of Florida coast sponges; and enforces the law regulating the interstate shipment of large and small-mouth black bass.

Bureau of Mines, Department of Interior, Washington, D. C.

Charged with the investigation of methods of mining; preparation and utilization of mineral substances, with special reference to the safety of mine workers and the improvement of their working conditions, and the prevention of waste thru increased efficiency. It also collects and publishes statistics covering mineral production of the United States, and makes studies of economic problems affecting the mineral industries.

Bureau of Reclamation, Department of Interior, Washington, D. C.

Directs investigation of irrigation projects; has supervision over construction of Boulder Dam and the development of the Colorado River Basin; also over the Grand Coulee Dam and Columbia River Basin.

Extension Service, Department of Agriculture, Washington, D. C.
Sponsors 4-H Clubs whose work includes a conservation education program.

Federal Power Commission, Washington, D. C.

Organized to administer the Federal Water Power Act which provides for the improvement of navigation thru the development of water power on streams subject to federal jurisdiction or on public lands by private and governmental agencies acting under licenses issued by the Commission, licenses so issued to be subject to conditions prescribed to promote navigation and to conserve water-power resources for the public good. It is authorized to conduct general investigations of power resources.

Forest Service, Department of Agriculture, Washington, D. C.

Has general administration of national forests; conducts forest research; promotes improved forestry practices; regulates grazing in national forests; manages watersheds protected by national forests; supervises forestry emergency activities of the Civilian Conservation Corps; cooperates in development of state forests.

Geological Survey, Department of Interior, Washington, D. C.

Classifies public lands and examines geologic structure, mineral resources, and mineral products of the national domain; conducts investigations on quantity, distribution, mineral quality, availability, and utilization of water supplies in the United States, and studies production of hydroelectric power for public use; examines and classifies public lands as to their mineral resources and their value for power development; supervises oil, gas, and mining operations on public lands included in prospecting permits and leases under mineral leasing laws.

National Bituminous Coal Commission, Washington, D. C.

Its purpose, to administer the Bituminous Coal Conservation Act of 1935, in order to conserve the bituminous coal resources of the United States; to stabilize the bituminous coal-mining industry and to promote interstate commerce; to promulgate a bituminous coal code and to study and report upon the problems confronting the bituminous coal industry.

National Forest Reservation Commission, War Department, Washington, D. C.

Purchases such forested, cut-over, or denuded lands within the watersheds of navigable streams as in its judgment may be

necessary to the regulation of stream flow and the production of timber.

National Park Service, Department of Interior, Washington, D. C.
Directs protective work toward preserving national parks for all generations and utilizing them to the best advantage for the benefit and enjoyment of the visitor; furnishes public educational service in natural sciences, history, and archaeology, in connection with areas under its care; participates in the Emergency Conservation Work program and supervises work camps engaged in recreational development on state, county, and municipal areas; cooperates with regional and state planning boards and conservation agencies.

National Resources Board, Washington, D. C.
During its brief lifetime this agency issued a number of excellent reports such as *General Conditions and Tendencies Influencing the Nation's Land Requirements*; *Agricultural Land Requirements and Available Resources*; *Land Available for Agriculture thru Reclamation*; *The Problem of Soil Erosion*; *Forest Land Resources, Requirements, Problems, and Policy*; *Planning for Wildlife in the United States*; and *Recreational Use of Land in the United States*. These bulletins may still be secured from the Superintendent of Documents.

Petroleum Conservation Division, Department of Interior, Washington, D. C.

Assists the Secretary of the Interior to administer the Connally Law, which prohibits shipment in interstate commerce and foreign commerce of petroleum or its products produced in excess of the amount permitted by law.

Soil Conservation Service, Department of Agriculture, Washington, D. C.

Promotes use of soil conservation practices in agriculture; conducts research and demonstration projects in soil conservation; directs erosion-control activities of soil conservation district offices.

Tennessee Valley Authority, Knoxville, Tennessee

Responsible for the maintenance and operation of government-owned properties in the vicinity of Muscle Shoals, Alabama, which involves planning for the complete Tennessee River watershed, including erosion control, forestation, the further

use of mineral resources, the promotion and coordination of industry and agriculture, surveys and plans for the proper use of land and other natural resources, and the general social and economic well-being of the valley.

NATIONAL PRIVATE ORGANIZATIONS

A number of private agencies and organizations are active in the conservation work. Among them are the following from whom pamphlets, bulletins, films, slides, charts, or exhibits, can be secured:

American Forestry Association, Washington, D. C.

Encourages conservation in the field of forestry. Magazine, *American Forestry*.

American Nature Association, Washington, D. C.

Issues books, a publication entitled, *Nature Magazine*, and other material to stimulate public interest in every phase of nature and the out-of-doors, and is devoted to the practical conservation of the great natural resources of America.

American Wildlife Institute, Washington, D. C.

An organization for the restoration of North American wildlife.

Boy Scouts of America, National Office, 2 Park Avenue, New York, New York.

Among the "Merit Badge Series" of publications issued by this organization for the purpose of encouraging boy scout activities in special fields are many which relate to conservation such as Agriculture, Animal Industry, Bird Study, Conservation, Forestry.

Camp Fire Girls, 41 Union Square, New York, New York.

Promotes conservation thru "Torch Bearer Craftsman in Conservation" program and thru Nature Lore.

Film Libraries

Contain motion pictures, slides, and perhaps flat picture packets which can be secured on a rental or gratis basis. Your local superintendent or principal should have such film library catalogs.

Friends of the Land, 1638 North High Street, Columbus, Ohio.

Conducts an active program to develop understanding of wise land-use. Organizes local chapters, and supplies certain materials.

Garden Club of America. Conservation and Roadside Committee.
598 Madison Avenue, New York, New York.

Prepares information on various aspects of conservation. Cooperates with agencies and organizations developing conservation programs. Distributes material.

General Federation of Women's Clubs. Department of Education.
1734 N Street, Washington, D. C.

Has active program in the field of conservation activities.

Girl Scouts, 570 Lexington Avenue, New York, New York.

Has a program of Outdoor Life and Conservation as a part of the girl scout work.

Izaak Walton League of America, Merchandise Mart, Chicago, Illinois.

Prepares and distributes material on woods, waters, and wildlife. Publishes *Outdoor America*. Encourages organization of Junior Izaak Walton Leagues to enlist the interest and support of boys and girls in the cause of conservation.

National Education Association, 1201 Sixteenth Street, N.W., Washington 6, D. C.

The office has published a number of teachers bulletins dealing with conservation such as, *Teaching Conservation in Elementary Schools*, and *Conservation Films*.

National Recreation Association, 315 Fourth Avenue, New York, New York.

Collects and disseminates information on all types of recreational activities, assists in carrying on local community recreation projects, publishes monthly magazine, *Recreation*. Includes consideration of conservation and nature projects in its recreational activities.

Wilderness Society, 1840 Mintwood Place, Washington, D. C.

Publishes *The Living Wilderness*. Organized to furnish leadership and encourage activities directed toward the preservation of our remaining wildernesses on state and private lands which have no governmental protection.

Wild Flower Preservation Society, 3740 Oliver Street, Washington, D. C.

Prepares information and materials on the preservation of wild flowers.

STATE AGENCIES

Many individual states have issued information on resources in the form of booklets, bulletins, reports, charts, and guides. Such agencies as the following will often provide speakers as well as printed and audio-visual materials:

State Departments of Conservation, Agriculture, and Commerce

Many state governments include operating departments or divisions specifically organized or responsible for conservation activities of many kinds. An inquiry directed to your own secretary of state will bring full information.

State Department of Education

A number of state education departments have issued teaching guides, bulletins, suggested units of work, bibliographies of books, pamphlets, films, and the like. Write to your state superintendent of public instruction or commissioner of education for information, bibliographies, and loan kit publications.

State Library

State libraries usually house considerable printed matter dealing with conservation in all fields. Your local library can arrange an inter-library loan if desired.

LOCAL AGENCIES

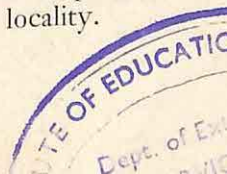
Within the local community one may secure information and other aids from such sources as these:

Colleges and Universities

Most institutions of higher learning include staff specialists with competence in the broad field of natural resources and their wiser use. It should prove worthwhile to make a specific request of the president's office.

County Agricultural Office

Most rural counties in the United States maintain county agricultural offices which stress conservation in their educational work. A letter or telephone call to your county agricultural agent at the county seat may provide printed materials, pictures, slides, films, and speakers as well as field trip, survey, service project, and work experience opportunities in your own locality.



District Office of the United States Soil Conservation Service

Every one of the forty-eight states has passed soil conservation legislation establishing local conservation districts. As of December 1946, 1793 such local districts have been organized. In Washington State for example, there are thirty-eight local district field offices with regional headquarters in nine communities. Each of these local offices has literature available for school use.

More Than a Byword

In self-education, in the schools, in the public forum, and in the whole communication process of our time it is essential that the wise use of natural resources becomes more than a catch-phrase, more than a byword, more than a "subject" of study. Wise resource-use, as this volume has tried to define and sketch it, must be widely recognized as a major educational problem of our time. It must permeate many aspects of the school curriculum; must become a significant general theme to which many school and community activities in art, biology, chemistry, English, home economics, industrial arts, science, social studies, and other areas of study are closely related.

Particularly in the now-emerging community school will a wise husbanding and appropriate use of resources be emphasized. It is thru such a school that communitywide education and intelligent public action can best be promoted as the only sure basis for enduring social advance. But regardless of school philosophy, the natural environment can no longer remain an elective subject of academic study. Conservation must now enter the required core of human experience as transmuted thru the school curriculum. The wise use of soil, mineral, water, and wildlife resources is actually prerequisite to the permanence of our urban as well as our agricultural life; to our forests, hydroelectric power, irrigation, flood control, food and clothing supplies, industrial power and products—to virtually every aspect of our common life and even to our national security itself.

Plan with vision—conserve carefully—use wisely—and we as a people can prosper in undreamed material achievement.

But continue to exploit—waste—destroy—and social decline begins.

Public ignorance and indifference are the twin threats to our common stability. Against them educators must advance in growing power the even more vital forces of popular enlightenment and democratic social action. *Ill fares our land—unless we study, plan, act.* The challenge of wise use of resources is upon this generation. In our response may lie our destiny and that of our children.

ACKNOWLEDGMENTS

A great number of interesting examples of school practices were submitted for the Committee's use in preparing the yearbook. Those listed below were kind enough to submit examples which, for one reason or another, could not be used. The Committee wishes to express its appreciation for their aid.

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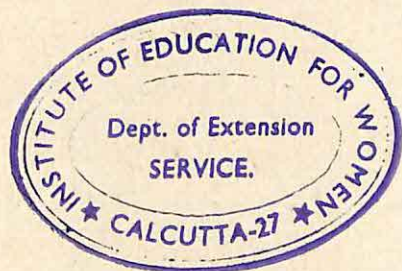
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CHAPTER QUOTATION REFERENCES

Chapter I

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Chapter II

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Chapter IV

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- White Plains
Winstead, Ora M., Principal
- Whitesburg
Brown, Myrel C., Helping Teacher
Sexton, Agnes
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Taylor, Loma J., Helping Teacher,
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- Creole
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